UNIVERSITY OF CALIFORNIA
AT LOS ANGELES

EX LIBRIS

Digitized by the Internet Archive
in 2014

https://archive.org/details/geographicalmaga04mark

THE

GEOGRAPHICAL MAGAZINE.

EDITED BY

CLEMENTS R. MARKHAM, C.B., F.R.S.

VOLUME IV.—1877.

ILLUSTRATED WITH TWENTY-TWO MAPS.

UNIV. OF CALIFORNIA
AT LOS ANGELES
LIBRARY

LONDON:
TRÜBNER & Co., 57 AND 59, LUDGATE HILL, E.C.
1877.

LONDON:
T. PETTITT AND CO., PRINTERS,
FRITH STREET AND OLD COMPTON STREET,
SOHO, W.

CONTENTS OF VOLUME IV.

ARTICLES ARE INDICATED BY AN (*) ASTERISK.

EUROPE.

Map.

European Turkey.—Map of the Seat of War.

Articles and Notes.

PAGE.
*French Cadastral System, The ... 233
Marseilles Geographical Society ... 216
Russia in Europe, Ethnology of ... 129
*Seat of War, The ... 251
*Tiber, The Works on the ... 60
Turkey. Population of some of the Towns of Ancient Thrace ... 128
Turkey, New Sanjaks in ... 76
Vienna, Scientific Club of ... 191

Reviews.

Baker (Lieut.-Col. Jas.) Turkey in Europe ... 235
Burton (Capt. R. F.) Etruscan Bologna ... 17
Caviezel (M.) Tourist's Guide to the Upper Engadine ... 302
Cleghorn (Dr. Hugh). Royal Forest School at Vallombrosa ... 160
Denton (Rev. W.) Montenegro: Its People and their History ... 235
Mackay (Alex.) Handbook of the Seat of War ... 237
Mackenzie (G. Muir) and Irby (A. P.) Travels in the Slavonic Provinces of Turkey in Europe ... 235
Madrid Geographical Society's Boletins ... 43, 306
Paris Geographical Society's Bulletins ... 237
Vienna Scientific Club ... 191
Wallace (J. Mackenzie). Russia ... 72

Cartography.

Geikie (Archibald). Geological Map of Scotland ... 44
Illustrated London News War Maps ... 161
Kanitz's Map of Bulgaria ... 242, 274
Kips (J.) Map showing Roman Catholic Dioceses, Churches, Convents, and other Religious Institutions throughout Great Britain ... 161
Official European Cartography in 1875-76 ... 104, 126
Stanford's Library Map of London ... 303
Stanford's Map of Turkey in Europe ... 161
Stanford's Map of the Seat of War in European Turkey ... 303

ASIA.

Maps.

Bombay and Madras Famine Districts, 1877.
Asia Minor, Seat of War in
Himalaya and Tibet.—A View of the Mountain System bounded by the Plains of India, Gobi, China and the Caspian.
Himalaya, Sketch Map of the Principal Natural Divisions of the, 1857.
Malabar Coast, Portion of the
Southern India, Map showing distribution of Persons relieved in the Famine Districts of
Krishna Basin.

Articles and Notes.

PAGE.
Alai and Pamir Heights, in the ... 277
Alai and Pamir, The Russian Expedition to the, in 1876 ... 48, 78
*Altai Mountains, M. Potanin's Journey through the ... 118
Amu-Darya Exploration (Major Herbert Wood) ... 131
Amu-Darya, Navigation of the (R. E. Carr) ... 190
*Asia, The Seat of War in ... 147
*Asiatic Russia, Topographical Surveys in, during 1875 (M. Venyukof) ... 64
Baku as a Central Point of the Overland Route to India ... 161
Baluchistan, Journey in ... 246
*Bengal Cyclone of 1876 ... 198
Bengal, Cyclone and Storm-wave in ... 18
Bokhara, Tea trade in ... 216
Brahmaputra, Course of the ... 246
Burma Proper, Mr. Strettell's Journey in ... 108
Central Asia, Col. Prejevalsky in ... 129, 333
*Champa (Col. H. Yule, C.B.) ... 66
*China, The Abbé Armand David's Travels in (A. E. Hippisley) ... 28
China, Baron von Richthofen's New Work on ... 129
*Corea (Samuel Mossman) ... 148
Dutch Sumatran Expedition, The ... 76
Eastern Persia, Volcanic Region in ... 240
Eastern Turkistan, Explorations in ... 240
*India, Great Trigonometrical Survey of, 1874-75 ... 12
India, Overland Route ... 245
*India, Famine in, 1876-77 ... 286
*Indian Famines and Sun-spots ... 311
Indian Famine Taxes (H. P. Malet) ... 191
*Indian Marine Surveys, 1874-76 ... 99
Indus River, Survey of the Mouth ... 216
*Japan, Affairs in (R. H. Brunton) ... 202
Japan, M. Voieikof's Travels in ... 222
Haifong and Hanoi in Tonquin, Sir B. Robertson's Visit to ... 46
*Himalayan System, The (Clements R. Markham) ... 113
*Himalayan System, The (Trelawney Saunders) ... 173
Lhasa ... 241
*Madras and Bombay, Famine in ... 111, 286
*Malabar Coast, Extension of the (E. W. Pringle) ... 230
Mongolia, Expedition through ... 241
Nain Singh's Journey in Great Tibet ... 191
Nicobar Islands, Funeral Ceremonies at the (F. E. Tuson) 305
Palestine, Exploration of ... 245
*Quetta and the Afghans (Major H. G. Raverty) ... 288
Richthofen's New Work on China ... 129
*Southern India, Irrigation in (Clements R. Markham).
  (III.) The Basin of the Kavery ... 279
  (IV.) The Basin of the Krishna ... 307
*Tibet, The Abbé Desgodins on ... 14
*Tong-kin and Yunnan, M. Dupuis, Exploration in ... 253
Trans-Himalayan Missions (T. S.) ... 130
Travancore, Census of ... 45
Sinai, Site of Mount ... 246
Upper Indus, Exploration of ... 304
*Upper Oxus Basin, Note on the Drainage of the (Major Herbert Wood) ... 229
Vladivostok ... 45
*Water-Partings *versus* Ranges (R. B. Shaw) ... 314
*Yangtsze River, Delta of the (Samuel Mossman) ... 256
Yarkand River, The Drainage of the (R. B. Shaw) ... 330

Reviews.

PAGE.
Burnaby (Capt. F.) Travels and Adventures in Central Asia ... 16
Fraas (Prof. Oscar). Drei Monate in Libanon ... 43
Hughes (A. W.) The Country of Baluchistan ... 74
Hume (A. O.) The Laccadives and the West Coast (*Stray Feathers*) ... 104
Ratzel (Dr. F.) Die Chinesische Auswanderung ... 17
Richthofen (Baron Ferdinand Freiherrn von). China ... 270
Schefer (Ch.) Iter Persicum ... 213

Cartography.

Brunton (R. H.) Nippon (Japan) ... 160
Indian Survey Maps ... 44, 75, 214, 302
Indian Marine Survey Maps ... 238
Stanford's Map of the Seat of War in Armenia ... 303
Turkestan, New Russian Maps of ... 242

AFRICA.

Maps.

South African Republics.
Upper Nile, The (Mruli to Dufli).
Lukuga, The.
Alexandra Nile, The.
Lake Nyassa, Country round.
Congo River.

Articles and Notes.

*Africa, International Exploration of. The Share of Portugal ... 9
Africa, The Portuguese in ... 76
African Exploration ... 246
African Exploration Fund ... 217
Central Africa, Proposed Stations in (Commander Cameron) 246
Central Africa (Papers read at the Royal Geographical Society)—
  Victoria Nile between Magungo and Foweira ... 21
  The Khedive's Expedition to the Lake Districts ... 21
  Circumnavigation of Lake Albert Nyanza ... 22
  Recent Sojourn at Lake Nyassa ... 108
  New Route and Mode of Travelling into Central Africa 109
Central Africa, Belgian Expedition for the Exploration of 304
Central Africa, Expedition of the Church Missionary Society ... 274
*Congo, Stanley's Voyage down the ... 318
Congo, Stanley's Discovery of the Course of the ... 275
Harar and the Somali Coast (Major Mokhtar Efendi) ... 82
Ibrahim, Piaggia's Survey of Lake ... 77
Inambane (E. Coast of Africa). Discovery of a Port near (St. Vincent Erskine) ... 132
Livingstonia ... 20
*Livingstonia Mission, The (Drs. J. Thornton Macklin and J. Stewart) ... 204
Lukuga Outlet of Tanganyika, Stanley's Visit to the ... 106
Madagascar, Recent Journeys in (Rev. Dr. Mullens) ... 78
Mozambique, The Portuguese Province of ... 241
Muata Yamvo, Dr. Pogge's Visit to ... 26
Mungao District (E. Africa), Visit to the ... 248
Niger, Journeys up the, and Notes on the Neighbouring Countries ... 193
*Nile from Mruli to Dufli, The ... 67
Nubian Railway ... 217
Ogowai River, M. Savorgnan de Brazza on the ... 304
Portuguese African Expedition, The ... 108, 217
Portuguese African Exploration ... 326
South Africa, Copper Mines in ... 277
*South African Republics, The ... 27
*Stanley's Maps ... 124
Uniamuesi, Description of ... 332
Upper Nile, The Slave Trade on the ... 327

Reviews.

Cameron (Verney Lovett). Across Africa ... 69
Campbell-Johnston (A. R.) South Africa: Its Difficulties and Present State, suggested by a Recent Visit to that Country ... 298
PAGE.
Cosson (E. A. De). The Cradle of the Blue Nile ... 125
Edwards (F. A.) Col. Gordon's Expedition to the Upper Nile Regions (*Gentleman's Magazine*) ... 213
Edwards (F. A.) Livingstonia (*Gentleman's Magazine*) ... 274
Klunzinger (C. B.) Upper Egypt: Its People and its Products ... 323
Mariette-Bey (Auguste) The Monuments of Upper Egypt 323
Noble (John) South Africa: Past and Present ... 298
Oliphant (Laurence) African Explorers (*North American Review*) ... 159
Pechuel-Losche (Dr.) Loango und die Loanskuste ... 302
Silver (S. W.) Handbook to the Transvaal: British South Africa: Its Natural Features, Industries, Population and Gold Fields ... 298
Smith (J. L. Clifford) Discovery of the Great Central Lakes of Africa ... 126

Cartography.

Nile between Dufli and the Albert Nyanza, The ... 75
Stanford's Library Map of Africa ... 274

AMERICA.

Map of the Purûs and Madeira Rivers.

Articles and Notes.

Amazons and its Tributaries, The (J. J. Révy and W. Chandless) ... 164, 190
Bolivia, Altitudes in ... 276
Bolivian Andes, Heights in the ... 215
Bolivia, A new map of ... 18
*Brazil, India-rubber Trees in (Robert Cross) 152, 182, 211
*Chile ... 90
Costa Rica, Herr Polakofsky on the Eastern Part of ... 334
Costa Rica, Prof. W. M. Gabb's Surveys in ... 305
Costa Rican Geography, Herr Friederichsen on ... 306
Colombia ... 162
Darien Exploring Expedition, The ... 162
Darien Isthmus, Canalization of the ... 45
England and Peru ... 326
Guatemala ... 276
*Patagonia, Exploration in (F. P. Moreno) ... 209
Peru ... 129
Peru, Census of ... 45
*Peru, The Great Earthquake on the Coast of, in 1877 ... 206, 277
Peru, Events in ... 215
Peruvian Geographical Society ... 45
*Purûs, The, in its Commercial and Geographical Relations to the Valley of the Madeira (Col. Geo Earl Church) 95
Tahoe Lake (Prof. C. Zehden) ... 52
*Vegetable Fountains of the Tropical American Wilderness (H. A. Wickham) ... 232
Wyse Darien Surveying Expedition, The ... 276

Reviews.

American Naturalist, The ... 274
Barrington Brown (C.) Canoe and Camp Life in British Guiana ... 124
Duffield (A. J.) Peru in the Guano Age ... 125
Wertherman (Arturo). Informe de la Exploracion de los rios Perenc y Tambo ... 324

Cartography.

Newfoundland, Geological Map of (Murray, Alex.) ... 75
Colorado Drainage Map ... 161

ARCTIC REGIONS.

Maps.

Arctic Regions.
Discoveries of the Arctic Expedition, Map, showing the
Kara Sea, illustrating Capt. J. Wiggins's Journey to Northern Siberia.
Outward and Return Tracks of the Northern Party of the late Arctic Expedition, Map showing the
Tracks of Sledge Party, commanded by Lieut. G. Le C. Egerton.
Archer Fiord and Plan of Petermann Fiord.

Articles and Notes.

PAGE.
*Arctic Expedition, The (Clements R. Markham)... 1, 22
  The Results ... 1
  Further Results. The Fossil Flora ... 324
  The Outbreak of Scurvy ... 3
  The Welcome Home ... 5
  *Work of the Auxilliary Sledge Parties ... 139, 167
  *Refutation of the Assertions of Hostile Critics ... 195
  The President of the American Geographical Society on the ... 88
  Committee to Investigate the Causes of the Outbreak of Scurvy ... 44
American Arctic Expedition, Proposed ... 54, 107, 239
Arctic Föhn, The (Sir G. S. Nares, R.N.) ... 316
Arctic Highlanders, use of Arrows by the ... 303, 325
Arctic Officers... 325
*Arctic Research, Continuance of.—I., Routes for Future Arctic Expeditions (C. R. Markham)... 223
Arctic Research, Austrian Scheme for ... 239
Arctic Scientific Stations ... 304
*Arctic Sledge Journals, The ... 83
Arctic Winter Experiences (Capt. Stevenson) ... 24
Dutch Polar Expedition, The ... 128
Dutch Arctic Reconnaissance, The ... 324
*Greenland Föhn, The (Capt. N. Hoffmeyer) ... 225
*Greenland, Sketches of Life in. The Moravians (S.N.R.) 7
*Moral Scurvy, The ... 89, 122
North Circumpolar Sea, The (Capt. Sir G. Nares) ... 23
Northern Russia, Exploration in ... 304
*Northern Siberian Expeditions, The ... 34
Northern Siberia, Sea Communication with ... 276
Norwegian Deep Sea Sounding Expedition of 1878 ... 303
Novaya Zemlya, Russian Wintering Station in ... 215
Palæocrystic Sea, The ... 325
Polar Expeditions (Robert T. Litton) ... 48
'Polaris,' Results of the Voyage of the ... 18
*Scurvy Committee Report, The ... 107, 145, 171
Scurvy Report, Queries touching the ... 217
Scurvy Theorists ... 189
*Siberia by Sea, communication with (Capt. J. Wiggins)... 55
Sledge Travelling (Capt. A. H. Markham)... 24
*Smith Sound, Navigation of, as a Route towards the Pole (Capt. Sir G. Nares) ... 119
*Swedish Arctic Expedition of 1878, The ... 297
Western Siberia, Bremen Expedition in ... 244
Whaling Fleet, The ... 275
Wrangell Land: Impropriety of changing names given by Discoverers ... 128

Reviews.

Bessils (Emil.) Scientific Results of the United States' Arctic Expedition ... 273
Beynen (Lieutenant Koolemans). The Three Voyages of William Barents to the Arctic Regions ... 70
Black (Dr. Patrick). Scurvy in High Latitudes ... 15
Davis (Rear-Admiral C. H. Davis). Narrative of the North Polar Expedition under the command of Capt. F. C. Hall ... 273
Feilden (Capt. H. W.) On the Birds of the North Polar Basin ... 213
  The Mammalia of North Greenland and Grinnell Land 268
  Arctic Molluscan Fauna ... 268
Gwyn Jeffreys (J.) The Post Tertiary Fossils procured by the late Arctic Expedition, with Notes on some of the Recent or Living Mollusca from the same Expedition 268
Geographical and Scientific Results of Arctic Expedition (*Quarterly Review*, Jan. 1876) ... 43
Jonge (J. K. J. de) Nova Zembla (1596-97). The Barents' Relics recovered in the Summer of 1876 by Charles L. W. Gardiner and presented to the Dutch Government 302
Myers (Mr.) List of Crustacea collected by the Arctic Expedition ... 268
Rink (Dr. Henry). Danish Greenland: Its People and its Products ... 234
Smith (Edgar). Recent or Living Mollusca, brought home by the Naturalists of the Arctic Expedition ... 268
Watts (W. Lord). Across the Vatna Jökull ... 102

AUSTRALIA AND POLYNESIA.

Articles and Notes.

PAGE.
*Crozet Islands, The (Capt. Lindesay Brine, R.N.) ... 266
*Formosa, A Description of the Island of (James Morrison) 260, 293, 319
Formosa from Tamsui to Taiwanfu, A Journey through ... 135
McCluer Gulf and Melanesia, Natives of ... 137
Marquesas Islands, The ... 277
New Guinea, Journey along the Southern Coast of ... 242
New Guinea, Miklukho Maclai on ... 76
New Zealand, Forest Conservancy in ... 239
*Perim Island ... 290
Polynesian Migration (John Findlay) ... 305
Sandwich Islands, The Recent Volcanic Irruption at the (Capt. H. W. Mist, R.N.) ... 133
Western Australia ... 244

Reviews.

Hayter (H. H.) Notes on the Colony of Victoria ... 188
Reid (G. H.) An Essay on New South Wales ... 43

PHYSICAL GEOGRAPHY.

Articles and Notes.

*Atlantic Ocean, Temperature of the (Capt. J. E. Davis, R.N.) ... 35
*Age of this Earth, The (H. P. Malet) ... 38
Amazon Valley, Barometrical Heights in the (W. Chandless) ... 133
Comparative Antiquity of Continents, as indicated by the distribution of Living and Extinct Animals (A. R. Wallace) ... 220
Distribution of Salt in the Ocean, as indicated by the Specific Gravity of its Waters ... 134
Earth's Rotation, The (J. Alfred Novello) ... 20

Reviews.

Campbell (Lord George). Log Letters from the 'Challenger' ... 41
Jarz (Dr. Konrad). Die Strömungen im Nord-Atlantischen Ocean ... 74
Johnston (Keith). Physical Geography (Stewart's Local Examination Series) ... 160
Jordan (W. Leighton). Current-creating Action of Vis-inertiæ in the Ocean ... 102
Piddington (Capt. H.) Sailor's Horn Book of the Law of Storms ... 17
Spry (W. J. J.) Cruise of H. M. 'Challenger' ... 41

MISCELLANEOUS.

Articles and Notes.

Awards of the Royal Geographical Society for 1877 ... 127
Comans or Kipchacks, The (H. H. Howorth) ... 19
Geographical Prize Essays ... 77
German African Society, A ... 18
Granicus, Site of the Battle of the ... 327
Kankalis, The (H. H. Howorth) ... 162
Pechenegs or Karakalpaks, The, (H. H. Howorth, A. Vambery, and R. Michell) ... 46, 78, 132
Portuguese Colonies ... 18
Provision of Charts and Sailing Directions for Government Transports (A. W. Stiffe) ... 77
Russian Travellers ... 187
Turkish Tribal Names (Thos. W. Kingsmill) ... 189
Uzes, Torks, or Magyars (H. H. Howorth) ... 217, 327

Reviews.

Andree (Dr. Karl) Geographie des Welthandels ... 188
Bedford (Capt. F. D. G.) The Sailors' Pocket Book ... 187
Behm (E.) and Wagner (H.) Die Bevölkerung der Erde 74
Danvers (F. C.) Information for Colonial Engineers ... 160
Draperon (Ludovic) Revue Géographique ... 43

PAGE.
Giglioli (Prof. H. H.) Viaggio intorno al globo della R. pirocorvetta Italiana ‘Magenta’ 272
Grove (Geo.) Introduction to Geography (History Primers) 160
Kloedon's Handbuch der Erdkunde 188
Leupe (Major). Capt. John M'Cluer en ziin verrichtingen omde oost 1790- 1795 300
Major (R. H.) Discoveries of Prince Henry the Navigator 157
Meadows Taylor (Col.) The Story of My Life 322
Mosenthal (Julius de) and Harting (Jas. Edm.) Ostriches and Ostrich Farming 103
Peschel (Oscar). Geschichte des Zeitalters 126
Tozer (H. F.) Classical Geography (History Primers) ... 160
Vivien de St. Martin's Nouveau Dictionnaire de Geographie Universelle 104

Cartography.

Vivien de St. Martins Atlas Universelle 106

PERSONAL MEMORANDA.

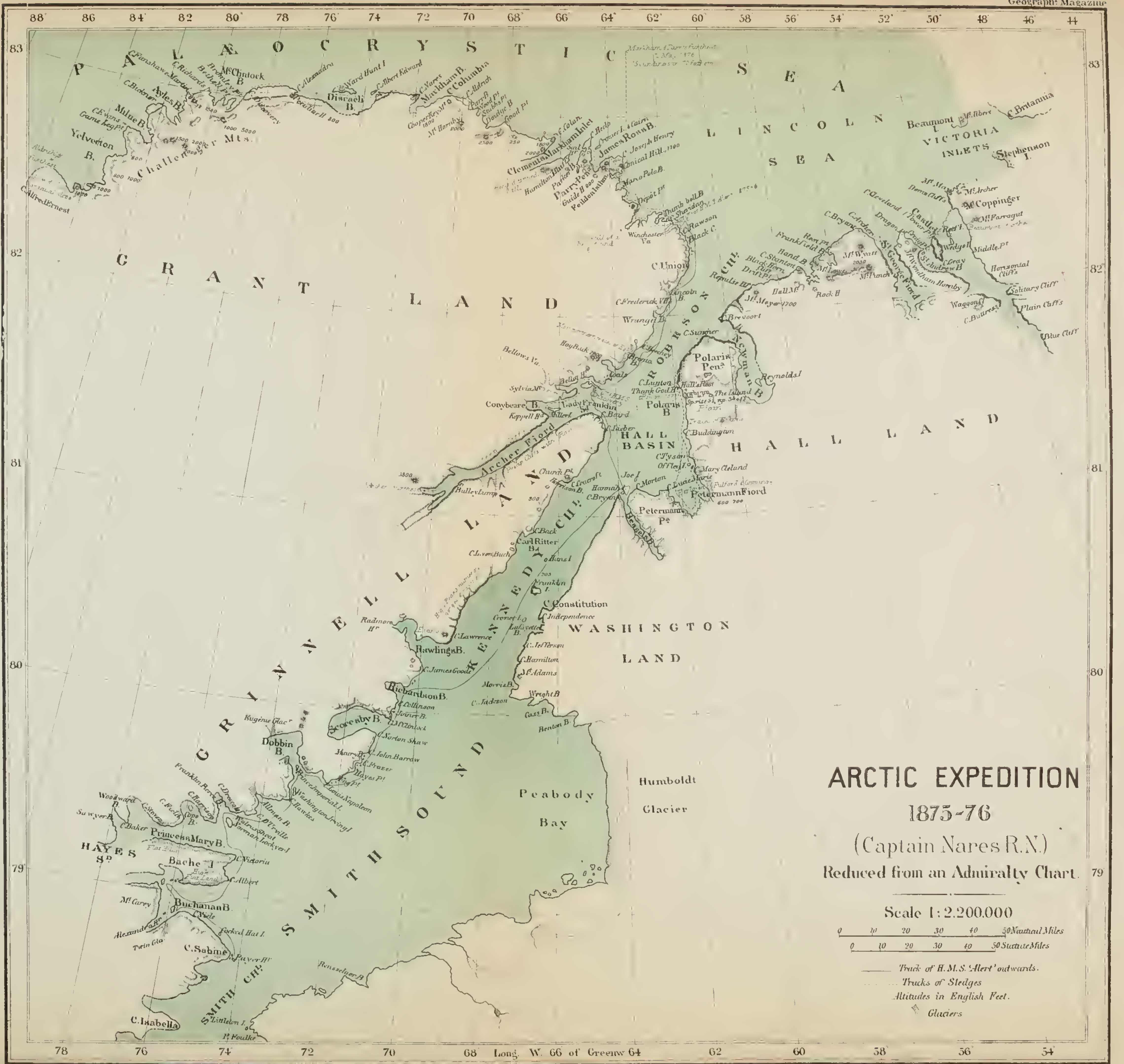
OBITUARY.

Articles and Notes.

Antinori, The Marquis 330
*Davis, The late Capt. J. E., R.N. 68
Conlan's (Dr.) Promotion 161
Errazuriz, Don Frederico, late President of Chile, Death of 278
Gessi, Romolo 242
Goodenough Memorial, The... 76
Kurapatkin, Capt. 240
PAGE.
Lockwood, Capt., in Persia 240
McCluer, Capt. John 300
Macgregor, Col., in Persia 240
*Montgomerie, Retirement of Col. T. G. 123
Moreno, Don Francisco P., Explorations of 326
Orton, Death of Professor 325
Prejevalsky, Col. 128, 216, 240, 333
Pundit Nain Singh, the Indian Explorer 46
Robertson's, Sir B., Visit to Haifong and Hanoi in Tonquin ... ... [illegible]
Strettell's (Mr.) Journey in Burma Proper 108
Wiggins, Capt. 326
Young, Sir Allen, Knighthood of 107

PROCEEDINGS OF SOCIETIES.

Antwerp 278
Berlin 21, 52, 136, 165, 333
Bordeaux 82
British Association, Geographical Section (President's Address) 243
Danish 166
Egyptian 53, 82
Hamburg 53, 82, 137 306
Italian 54, 109, 166, 194, 222 250
Lyons 82, 194, 249
Lisbon 110, 137, 194, 306
Paris 53, 81, 110, 136, 165, 193, 249, 278, 334
Paris Commission 249, 334
Portuguese 137
Russian... ... ...136, 222, 249, 333
Vienna 52, 82, 137, 165, 250
Royal Geographical Society, 21, 48, 78, 108, 134, 191, 220, 331



ARCTIC EXPEDITION
1875-76
(Captain Nares R.N.)

Reduced from an Admiralty Chart.

Scale 1 : 2.200.000

0 10 20 30 40 50 Nautical Miles

0 10 20 30 40 50 Statute Miles

Track of H.M.S. 'Alert' outwards.

Tracks of Sledges

Altitudes in English Feet.

Glaciers

G 1
G 291
v. 4

THE

GEOGRAPHICAL MAGAZINE.

JANUARY, 1877.

THE ARCTIC EXPEDITION.

XI.

The Results.

In our last number we discussed the work of the Arctic Expedition, compared it with that of former Expeditions, and proved that the explorers of 1876 were second to none when the exceptional difficulties they had to encounter are considered, and second only to two, namely McClintock and Mecham, when judged by the test of figures alone. We now propose to glance at the results of this work. At present it is not possible to do more than indicate the nature of these results; for it will take time to work up the vast mass of observations in numerous branches of science, and the large geological, botanical, and zoological collections.

The results of scientific importance to be derived from an examination of the immense unknown area round the North Pole were shown in the Memorandum of the Royal Geographical Society's Arctic Committee of 1873 to be as numerous as the region to be explored is extensive. The Expedition secured these results so far as regards that portion of the unknown area which was within reach, from the base established in 82° 27′ N., and longitude 63° W. Thus a good commencement was made in the examination of the Polar region, important discoveries were achieved, and a great store of additional knowledge and experience was accumulated.

In geography the Royal Geographical Society's Arctic Committee pointed out that, by the Smith Sound route, a problem of great importance would be solved by ascertaining the extent and nature of the northern coast of Greenland, by exploring the land to the westward, and discovering the conditions of land and sea in that portion of the unknown area.

The Expedition has secured these results. The western coast of the channels, from the entrance of Smith Sound to the Palæocrystic Sea, a distance of upwards of 200 miles, has for the first time been surveyed and accurately delineated. The shores of the Palæocrystic Sea, westward from Robeson Channel, have been discovered and surveyed, and its physical geography has been fully ascertained for a distance of 250 miles. The north coast of Greenland was also discovered for about 100 miles; with its deep inlets and off-lying islands.

Next to the geographical come the kindred hydrographic results; and the Committee urged that, as regards the unknown seas, their hydrography has a most important bearing on the general question of oceanic currents, a question which is of practical consequence to navigation. The discoveries of the Arctic Expedition, in this one branch of inquiry, are so important that they alone are worth the whole expenditure twice over.

On reaching the northern outlet of Robeson Channel, instead of finding the navigable sea and continuous land trending polewards that they had been led to expect, the explorers found the land trending east and west, and that the sea was covered with broken-up ice of immense thickness and great age. The phenomena connected with this remarkable frozen sea, so unlike anything hitherto seen by Arctic voyagers, except by McClure off Banks Island, are of the utmost importance as regards the general hydrography of the globe. The explorers had reached the most desolate solitudes hitherto discovered. Marine life almost entirely ceases. There is no whale's food, no cetaceans, no seals, no bears, and no birds take their flight across the Sea of Ancient Ice. Its huge floes are from 80 to 100 feet in thickness, and the pieces broken off and forced upon the shore have all the characteristics of icebergs, fragments of these mighty frozen glaciers. They, therefore, very appropriately received the name of floe-bergs.

Physical geography, like every other science, needs special names for new phenomena; and differing as it does from all other known seas in the extraordinary character of its huge floes, the Sea of Ancient Ice, bordering the most northern known land in the world, needed a special name to distinguish it from other ice-bearing seas. It received the appropriate and convenient designation of the Palæocrystic Sea (παλαιὸς, ancient, and κρυσταλλος, ice), a term which will in future serve to distinguish the ocean which is laden with floes of enormous thickness and great age, extending for 1200 miles from the coast of North America to the north shores of Greenland.

In his paper read before the Geographical Society, on the 12th of December, Sir George Nares briefly described the position of the Palæocrystic Sea in the hydrographic economy of the globe. He pointed out that a considerable body of warm water flowed from the Atlantic towards Spitzbergen, and a smaller one from the Pacific, through Behring Strait into the North Polar Basin; and that so large a volume could not be continually flowing into an inclosed space without running out elsewhere. Accordingly, in all other channels leading from the Palæocrystic Sea an

358968

icy cold surface current is running to the southward. The two principal cold currents flow down the east coast of Greenland, and the west side of Baffin's Bay, at an average rate of about 4 miles a day as shown from the drift of the 'Hansa.' This rate, however, is only obtained in the East Greenland current south of about 75° N., where a stronger current, coming from the north-east unites with the Greenland current.

Sir George Nares describes the Polar Basin as a locked-up bay continuing out of the narrowed North Atlantic Channel, with a warm stream of water constantly pouring into it between Norway and Spitzbergen, and cold currents always running out between Spitzbergen and Greenland, and through narrow straits between Greenland and America. Thus is heat and cold distributed over a great part of the globe, and the temperature of the sea on the border of the cold current, only 2200 miles from the Equator, is the same as that in the warm current, midway between Norway and Spitzbergen, at nearly double the distance from the Equator.

Before the Palæocrystic Sea was discovered by the Arctic Expedition, the heaviest known ice was that which drifts down the east coast of Greenland and round Cape Farewell, and that seen by Collinson, McClure, and Mecham, pressing upon the shores of Banks and Prince Patrick Islands. At the north point of Prince Patrick Island it is lost, for Richards and Osborn found light ice along the north shores of the Parry Islands. Osborn, therefore, concluded with certainty that this light ice betokened a narrow channel, and that some protecting land existed to the northward. The discoveries of the Arctic Expedition extended for 300 miles along the shores of the Palæocrystic Sea, leaving 400 miles unknown from Aldrich's furthest to Ireland's Eye off the north point of Prince Patrick's Island, and 500 from Beaumont's furthest to Cape Bismarck.

Sir George Nares and his officers were on this Sea of Ancient Ice for eleven months. They examined it, and all the phenomena connected with it, explored its shores for 300 miles, and penetrated into its labyrinths of floes and hummock-ridges, until ten of them attained the highest latitude ever reached by any human beings. The names of those ten men should be placed on record. They are—

ALBERT H. MARKHAM,
Thomas Rawlings,
Thomas Jolliffe,
John Radmore,
Daniel Harley.
ALFRED A. CHASE PARR,
Edward Lawrence,
William Maskell,
John Pearson,
William Ferbrache.

By reasoning on evidence, which will hereafter be more fully set forth, Sir George Nares came to the conclusion that a very broad sea extends north of Cape Colombia, at least as far as the Pole, that the land trends southwest towards Prince Patrick Island, and that the coast of Greenland does not extend much further north than Cape Britannia. The probable trend of the coasts is indicated by similarity of tides between two known points, prevailing winds, and the nature of the movements of the ice.

It is certain that there is a large sea, and that the sea is covered with ice during the winter. In the summer, from various causes, this ice becomes subject to motion by the winds and currents, and gradually breaks up into fields and floes, which are ever decreasing in size as the season advances. Soon after the first week in July the whole pack of ice begins to drive backwards and forwards, according to the wind or current, its main course being towards the channel of outlet, where it escapes in small quantities out of the Polar Basin. Gaining more room as the season advances, the pack itself gradually breaks up, when any space left vacant is immediately occupied by the frozen masses, each field and floe struggling and forcing its way to get a clearer space. Towards the end of September the increasing frost begins to cement together the contending masses, and by November the whole sea is quiet again, the ice only cracking occasionally with the tidal currents. The new formation of ice during seven months in the year more than equals the decay during the other five.

Thus the pack covering the Palæocrystic Sea is a collection of separate pieces of ice, moving among each other during the summer, each piece grinding against its neighbour as the whole jostles its way along, slowing pressing forward towards the outlet between Spitzbergen and Greenland.

Whatever quantity of land may hereafter be discovered, Sir George Nares considers that the area of the Palæocrystic Sea will be found to cover at least one and a-half million square miles. The principal outlet, between Greenland and Spitzbergen, is not more than 300 miles wide; and, by the largest estimate, less than half a million of square miles of ice can escape in the year. Thus two-thirds of the total quantity would be left behind. But in reality very much less escapes, as is proved by the great thickness of the floes; which must be at least a hundred years old. The discovery of the extent and nature of this Sea of Ancient Ice, and the careful observations of its movements, of its tides, winds, and currents, and of all the phenomena connected with it, is one of the important results of the Arctic Expedition. These discoveries have thrown a flood of light on the physical geography of the Polar area.

The meteorological observations of the Expedition were most complete, and were all the more valuable because they consist of two series taken at two stations which, though only 70 miles apart, were very differently situated as regards surrounding land and sea. One faced the Palæocrystic Sea, while the other was within Robeson Channel. The phenomena of magnetism in the vicinity of the Pole were also considered to be of much scientific importance, and a very complete series of observations was taken at the two stations, as well as in other localities; while valuable observations were diligently made in other branches of physics.

A more complete investigation of the geology of the Arctic Regions was represented to be extremely desirable, both for its scientific importance and for the value of its practical results. The most interesting point connected with Arctic Geology is that having reference to the luxuriant vegetation of the miocene period, which was known to have existed in Greenland as far north as the 72nd parallel.

The Arctic Expedition has now discovered that these forests extended as far north as 82°; and the establishment of this fact is another result of such importance as to be worth the whole cost of the expedition twice over. Coal was found a few miles north of the winter-quarters of the 'Discovery,' of good quality, with numerous impressions of leaves on the overlying shale. The existence of this forest so near the Pole will give rise to speculations in which not only the science of geology but also that of astronomy is involved. It supplies evidence as to the physical conditions of the globe in past geological epochs. Most careful collections of impressions in the shale, and of the coal itself, were made; and specimens of fossils and rocks were collected from Cape Isabella to the furthest points discovered east and west of Robeson Channel, including an upper Silurian series, the miocene of the coal-beds, and the mountain limestone corals and shells of Cape Joseph Henry. Observations were also diligently made with reference to glacial action, to the effects of frost upon rocks, to evidence of the upheaval of the land, and to other geological phenomena.

As regards botany, a complete and exhaustive collection of plants was made, which will reveal the history of vegetation over a considerable area. Though this is one of the most poverty-stricken regions on the globe, as regards plants, Dr. Hooker has pointed out that it is possessed of unusual interest. The zoology of the newly discovered region has also been thoroughly investigated, and most valuable collections have been made, through the indefatigable labours of Captain Feilden and Mr. Hart, zealously assisted as they were by every officer in the expedition. The sea was made to yield up every living thing it contained, from the crustaceans 72 fathoms beneath its surface in 83° 20′ 26″ N., the most northern animals ever obtained. On the land everything that had life was diligently sought for and preserved, including a large collection of minute organisms only visible under the microscope, insects, fish, birds, and mammals. The distribution of animal life was also carefully studied, as well as the habits of the larger animals. In fact, for the first time, naturalists will have a complete and exhaustive knowledge of the biology of an extensive region, hitherto unknown.

The above notes only convey the merest sketch of the work that has been done. The observations still have to be worked up, the large collections have to be examined and each individual to be described. So that it will necessarily be some time before the complete results can be given to the world; and before the President and Council of the Royal Society will be able to pronounce a verdict on their value. Enough, however, is known to make it certain that, so far as scientific results are concerned, this is the most successful expedition that ever crossed the Arctic Circle. That of Sir John Franklin, with such men on board as Fitzjames, Fairholme, and Goodsir, must have done admirable work, but alas! it is lost to the world. The first voyage of Parry was, in its day, a great success; but it was before the time of exploration by sledge-travelling, and scarcely anything was done from the base of winter-quarters. The Search Expeditions, from 1848 to 1854, were not despatched for discovery or scientific research. Their objects were very different, and their great use was in having developed the system of exploring by sledge-travelling.

In stating the fact that the Expedition of 1876 was the most successful, it must not be supposed that there is the least shadow of depreciation cast upon the memorable and glorious efforts of its predecessors. Its members were equal to their predecessors in determination, in hardihood, and in ability; but not superior. Their greater success arises from the facts that they had, in many respects, approved appliances, especially as regards steam, and above all that they had the full benefit of the examples and of the experience of those who went before them.

Not the least important result of the late Arctic Expedition is that a new generation of Arctic officers has been trained as ice-navigators and sledge-travellers, young and zealous, and who are ready to come forward to repeat such glorious work as they have already achieved, whenever an opportunity offers. It was this result which Sherard Osborn looked upon as of as much consequence as any other; and now that the traditions of that illustrious seaman and of his comrades have been handed down and placed in the safe-keeping of such gallant successors, one of the dearest wishes of his generous heart have been fulfilled within two years of his lamented death.

When the welcome tidings of the safe return of the Expedition were first received, and the particulars of its marvellous labours and great success were made public, we wrote of those labours and of that success as they then struck us. In our previous and in the present number we have made a searching comparative analysis of the work of the explorers,* and have enumerated the results they have achieved. We have proved the correctness of what we first said, and we can now, therefore, emphatically repeat it in the same words:

"The most successful Arctic Expedition that ever left the shores of England has returned safely, after achieving an amount of valuable work such as has never been equalled, in the face of the most appalling hardships and difficulties. The success is absolutely complete; and all that not only can be done, but that real geographers ever wished to be done, has been achieved in the direction of Smith Sound."

XII.

The Outbreak of Scurvy.

The outbreak of scurvy among the explorers in the late Arctic Expedition was a terrible calamity. Yet the incidents connected with it give rise to feelings of pride and admiration. It enhanced the difficulties of the work, and the merit of having overcome them; and there is nothing in the whole annals of Arctic heroism that surpasses the gallantry of the sledge-travellers of 1876. With helpless men on the sledges, with their own work more than doubled, themselves stricken and suffering, yet these British seamen actually struggled onwards towards the Pole, resolved to uphold the honour of their flag and of their profession. At least, we may thank the scurvy for having added such a tale to the history of British prowess.

But the danger that was escaped was so imminent, and so terrible, that its character and the means of avoiding it demands the most careful and searching investigation.

---

* The following corrections should be made in our article on the work of the Arctic Expedition, in our December number. At page 315, column 2, line 9 from the bottom, for − 35° read − 25°. At page 316, column 1, line 18 from the bottom, for − 14° read − 44°.

In our previous number we briefly indicated the line such an investigation should take in order to arrive at useful conclusions; and we pointed out that the causes must be sought by comparison with the conditions influencing this and any previous Arctic Expedition which had no scurvy. We propose now to establish this view more fully and completely.

The cause of scurvy is frequently attributed to want of fresh vegetable food, and it is confidently affirmed by one school that lime-juice fully supplies the place of vegetables, and that scurvy can always be kept away by the use of lime-juice. This dogmatic assertion, which was recently put forward in a leading article in the *Times*, can be proved to be untenable. There are many instances of scurvy breaking out when lime-juice has been regularly administered. Dr. Ede informs us that he has seen cases of scurvy when lime-juice was given, and the men had been on salt beef and pork, with biscuit and no milk in the cocoa or tea, for nine months. So that lime-juice alone is not sufficient to entirely prevent scurvy. Another school of doctors, headed by Dr. Garrod, holds that the acid treatment is a mistake, and that scurvy is due to a deficiency of potash salts in the blood; while Dr. Black maintains that lime-juice is perfectly useless, and that scurvy in the Arctic Regions is solely due to a want of the means of keeping up the necessary heat of the body. Hence he advocates the use of blubber, of food containing sugar and starch, and of all heat-producing foods. Sir John Ross also believed that fish-oil was one of the anti-scorbutics provided by nature for the inhabitants of an Arctic land. The fact that far more nourishment is required in the frigid than in the temperate zone corroborates Dr. Black's view.

The truth, no doubt, is that the predisposing causes of scurvy are far more numerous and complicated than the lime-juice dogmatists are willing to allow. Among these are imperfect or too great sameness of diet, the absence of light, intense cold, and damp, when these deleterious conditions are unusually prolonged. It is generally assumed that the primary cause of scurvy is the want of vegetables. The predisposing causes in the Arctic Regions are the long winter and its accompanying privations, and the exciting causes are exceptionally hard work, or other similar conditions.

The 'Assistance,' one of the ships in the Arctic Expedition of 1850-51, returned to England without having had the shadow of a symptom of scurvy on board. Lime-juice was regularly administered during the winter; but, in the first instance, the freedom from scurvy arose from the varied diet more than from the lime-juice. In Baffin's Bay we brought off twenty-one dozen eggs at one place, twelve dozen at another, 315 looms at Cape Shackleton, besides eggs of dovekies, rotches, and terns in great numbers. The winter darkness lasted for ninety-four days, during which time an excellent routine of exercise and employment was observed; the people were kept amused, and there never was any sign of scurvy on board.

We may now compare the experiences on board the 'Assistance' with those of the 'Alert' and 'Discovery.' In the late expedition lime-juice was administered to every soul on board both ships with the utmost regularity. In no former expedition was more care taken in this respect. The daily issue was commenced on the 7th of June, nine days after leaving England. The men were mustered on the quarter-deck at half-past ten every forenoon and the allowance was issued and drunk there and then, in the presence of an officer, by every man on board. This was continued without intermission during the whole period of the absence of the expedition. The rest of the diet was practically identical with that on board the 'Assistance,' and the routine and general arrangements were the same. But there was one great and important difference. The winter darkness in the 'Assistance' only lasted for 94 days, while the crew of the 'Alert' had to endure a winter darkness of 142 days. Thus the period of darkness on board the 'Alert' was half as long again as that in the latitude where the 'Assistance' wintered. Moreover, at the 'Assistance's' winter quarters, there was never total darkness at noon, while with the 'Alert' there was greater darkness during the whole time from November 6th to February 5th than there was on the darkest day with the 'Assistance.' The intense cold, and the inevitable damp were also more prolonged; and the men of the 'Alert' were consequently exposed to darkness, damp, and extreme cold for a period half as long again as those of the 'Assistance.'

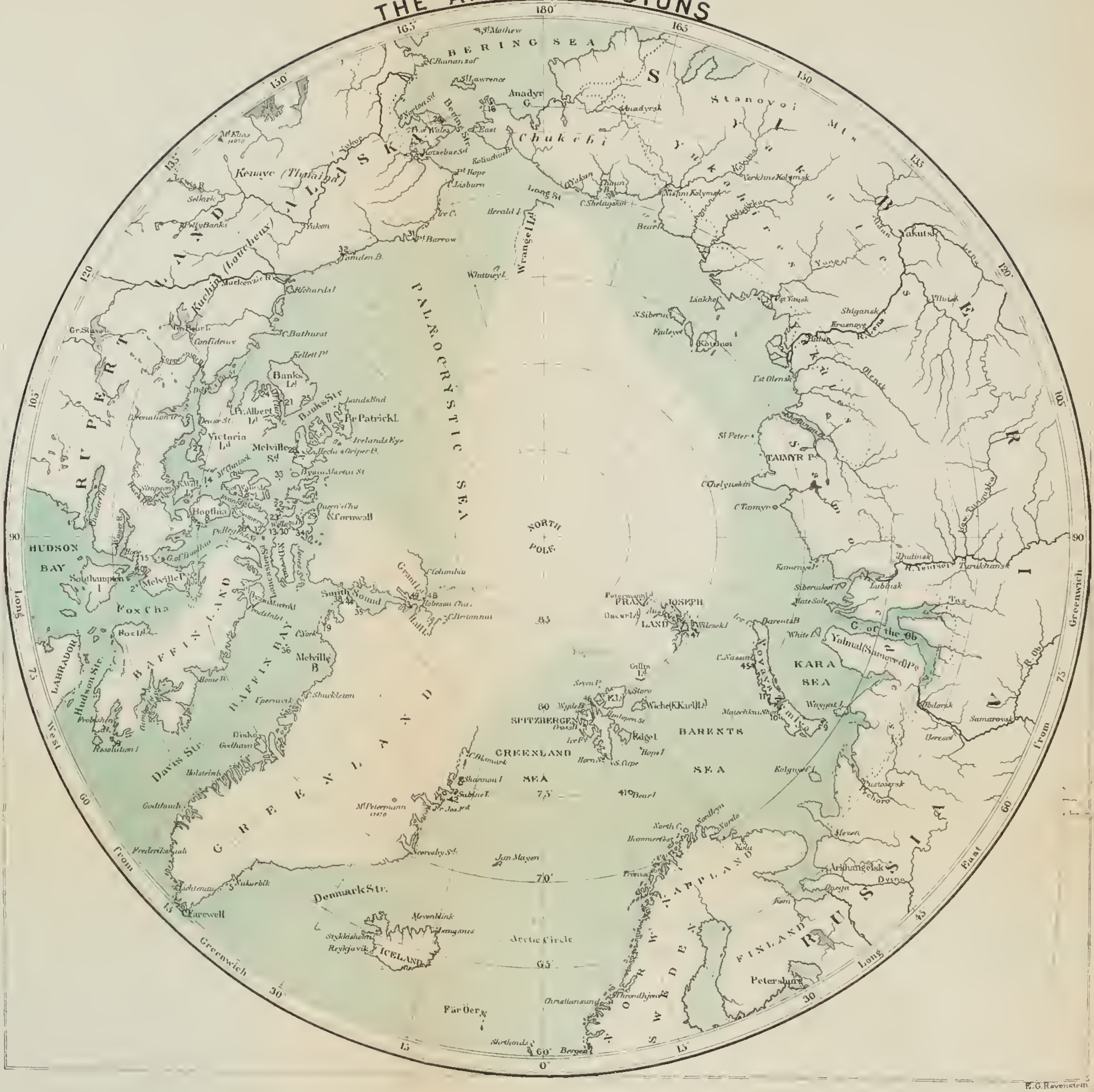
The diet, the use of lime-juice, and the routine were all the same in the 'Assistance' and in the 'Alert.' The only difference, and it was immense, was in the length of the winter darkness and its accompanying prolonged cold and damp. In Sir Edward Parry's first expedition of 1819-20, lime-juice was issued daily and drunk in presence of an officer, yet scurvy broke out, and Parry tells us that this was undoubtedly due to the damp between decks. One of the most eminent among Arctic medical officers is clearly of opinion that the first cause of the outbreak was the debilitating effect upon the constitution caused by the absence of light. Another cause was, he considers, the extreme and prolonged cold to which the men were exposed. As lime-juice was regularly administered, it is quite certain that the want of it was not the cause of the outbreak of scurvy; and there were cases of scurvy among men who never went away sledging, both in the 'Alert' and the 'Discovery.'

We now come to the second comparison, as regards the sledge-travelling. For this purpose we will take the 'Resolute' in 1853, as she was the ship on board of which Captain Nares acquired his experience in Arctic work. No lime-juice was taken on the sledges of the 'Resolute.'* The diet of the travelling parties of the 'Resolute' and 'Alert' was identical, and the weights were nearly the same. The scurvy did not attack the 'Resolutes,' while the 'Alerts' were disabled by it. No lime juice (with the exception of four quarts in the northern division of 1876) was taken in either case. This is a conclusive proof that the absence of lime-juice on the sledges of the 'Alert' was not the cause of the outbreak of scurvy.

---

* The misrepresentations of the *Times* on this point have been fully exposed by Dr. Scott, the Surgeon of the 'Intrepid,' and by Admiral Richards.

THE ARCTIC REGIONS



E. G. Ravenstein

The greatest amount of experience in sledge-travelling was acquired in 1853; and the precedents of the 'Resolute' were carefully followed in 1876. Yet in 1876 the scurvy broke out a few days after the men left the ship, those men having taken regular daily allowances of lime-juice for nearly a year. The cause must be attributed to the protracted cold, damp, and darkness they had endured for a period half as long again as that during which the men of the 'Resolute' were exposed to those influences; moreover, they had only enjoyed the restoring effects of the returned sun for one month before starting, while the 'Resolutes' enjoyed its influence for two months before they set out. These are the only differences between the two cases, and therefore the only reasons which can account for the fact of the disease attacking the travellers of 1876 and not those of 1853, the conditions affecting both being identical in every other respect.

No means were furnished to the Expedition for using lime-juice on the sledging parties, during the extreme cold of April and May. At a temperature of 20° to 40° below zero the lime-juice, in bottle or jars, becomes a solid mass, while the process of freezing separates its component parts. The strong acids are precipitated, and the bulk is a mass of watery refuse. Consequently the whole volume must be thawed and mixed again, every time it is used. This, of course, is impossible when bottles or jars are taken, as they would crack in the thawing process, and no other receptacles for the lime-juice were supplied to the Expedition. Lime-juice could not have been usefully taken on the sledges even if it had been necessary. But the experience of the 'Resolute' had conclusively proved that this was not the case.

The most important point to consider is the means of avoiding a similar outbreak of scurvy in future expeditions. We have learnt by experience that there is a great difference between the Polar Regions north of 82° and the Arctic Regions where former expeditions wintered, owing to the greater length of the winter nearer the Pole. In the far north the men are inevitably exposed, for a much longer time, to the predisposing causes of scurvy, extreme cold, damp, and long darkness. Dr. Woodward, in his "Report on the Camp Diseases of the United States Army," enumerates, among the determining causes of scurvy, excessive fatigue, want of exercise or its converse, cold, moisture, and bad ventilation. In the "Medical History of the British Army in the Crimean War," sameness of diet is added as a cause of scurvy.

When an expedition is to pass an Arctic winter which is much longer than any previously experienced, additional care must be taken in supplying as much vegetable diet as possible, and in securing greater variety. Condensed milk ought to be issued to all the men, and should not be confined to the sick, as well as egg-powder in abundance. There should be several additional sorts of preserved vegetables and fruits, for it is very important to vary the diet in every possible way. It is absurd to talk about taking lime-juice on the sledges, except in the summer months, but another vegetable might be added to the preserved potatoes. The chief point, however, is not to start until the sun has returned for full two months, and it is also clear that the sledging journeys must be shorter in proportion as the winter darkness has been longer and more severe. In the late Expedition the mistake was that the explorers attempted, under far more disadvantageous conditions, to do as much as could safely be undertaken by their predecessors further south. It was a noble and glorious mistake; and to it is due the rich harvest of valuable results with which the Expedition returned.

XIII.

The Welcome Home.

The vast and enthusiastic crowd which witnessed the departure of the 'Alert' and 'Discovery' from Portsmouth, on the 29th of May, 1875, formed a sight which will not soon be forgotten by those who heard the ringing cheers resounding over the harbour, and saw the densely-packed mass, with the thin red line passing through it. This sympathing crowd represented the feeling of the whole people of England. The despatch of the Arctic Expedition was a great and wise measure, which received the complete and hearty approval of the nation. Nor was the feeling transitory. No word was heard of the absent explorers for fifteen long months, but they were not forgotten; and when the glad tidings of their safe return, after doing all that was expected from them, and doing it well, was received in England, their countrymen were proud of their achievements, and prepared to give them a hearty welcome.

On the 2nd of November the two ships, much battered by the ice, with several boats missing, and other signs of rough usage, returned to Portsmouth Harbour; and once more a vast crowd assembled on the Common, and densely lined the beach, from Southsea Castle to the Dockyard Gates. Again the ringing cheers resounded from the shore, and were echoed back from the yards of the 'St. Vincent' and 'Duke of Wellington.' For the men who had gone forth a year and a-half before were returning to their homes, after having gloriously upheld the honour of their profession in a deadly and unequal struggle with the powers of nature. In spite of hardships and privations, of obstacles and difficulties, in spite even of scurvy, they had persisted in the steady performance of their duty until their work was done. They had planted the British flag on the most northern point ever reached by any human being; and returned with rich and fruitful results which have largely increased the sum of our knowledge. With good reason their welcome was warm and enthusiastic.

The careful perusal of the reports on the work done by the Arctic Expedition increased rather than diminished the feeling of congratulation that spread from England over the whole civilised world. The prompt recognition of the value of the services of the Arctic officers and men by Her Majesty and by the Admiralty was followed by the usual promotions; while the importance of the scientific results of the Expedition, and of its geographical discoveries, was, after careful consideration, most fully recognized in letters to Captain Nares, by the President and Council of the Royal Geographical Society, and by the Presidents of the Geographical Societies of France, America, Germany, and Austria. The Navy, with one voice, heartily and warmly acknowledged the gallantry with which its fame had been upheld in the Polar Seas. This feeling found expression in banquets given to the Arctic officers by the First Lord of the Admiralty, the United Service Club, the Naval Club at Portsmouth, the officers of the Royal Naval College at Greenwich, and the Officers of H.M.S. 'Excellent.'

But these dinners of welcome were not confined to the Navy, and the number of invitations exceeds anything that could have been expected. The truth is that there was a special reason for the invitations from several important bodies unconnected with geography or with the Navy. Some portion of the Press raised a cry of detraction, which was echoed by a yelping pack of ignorant critics. This gave rise to a strong feeling of indignation among the public, and was the direct cause of several banquets being given or proposed to the Arctic officers, which otherwise would not have been thought of. The attacks of an obscure portion of the Press had a very different effect from what was intended. We owe an apology to our readers for alluding to such garbage, but it seemed desirable to place on record the cause which led to invitations from at least some of the public bodies which have entertained the gallant explorers.

There was one reception which requires special notice. The only competent judges of the way in which officers and men of the late Arctic Expedition performed the task assigned to them are the veterans who served in former expeditions. If they are satisfied that the work was done well, it matters nothing what any other man may think. Their voices are unanimous, all uniting to approve most cordially of the achievements of their young successors. So that the dinner given by the old Arctics to the 'Alert' and 'Discovery' is by far the most significant of all the numerous recognitions they have received. It took place at Willis's Rooms, at 7 P.M., on Wednesday, the 6th of December.

It was more than seventeen years since the old Arctics had assembled at a social gathering. On the 5th of October, 1859, they gave a dinner to welcome home McClintock and the officers of the 'Fox.' On that occasion, as many as twenty-two old Arctic officers assembled from far and near. Dear old Sir Horatio Austin was in the chair, and he was supported by Captains Sir Edward Belcher, Bird, Collinson, Haswell, Sherard Osborn, Forsyth, and Jenkins; by Commanders Cator, Trollope, Hamilton, and May; by Lieutenants Nares, Murray Parks, Alston, Cheyne, and Meara; Doctors McCormick, King, and Ede; Mr. Allen, Mr. Biggs, and Mr. Clements Markham. Since then there has been a long interval, and the ranks are sadly thinned. Sir Horatio Austin is gone, and alas! Sherard Osborn, the originator and promoter of the Expedition, is lost to us. Yet such was the strength of the feeling that Nares and his officers and men were worthy successors in Arctic work, that the older officers again came up from far and near, many from remote parts of the kingdom, to do them honour. There assembled as many as twenty-eight old Arctics, an extraordinary number considering the length of time that had elapsed since they were serving within the frozen zone.

Sir George Back, the father of Arctic officers, who commenced his service in those regions fifty-eight years ago, was in the chair. There too were Sir Richard Collinson, who passed three winters in the ice, in command of the 'Enterprise;' Ommanney, the captain of the 'Assistance,' in 1850-51, with four of his officers, McClintock, the First Lieutenant, Vesey Hamilton, then a mate, Clements Markham, a midshipman, and Dr. Ede, the Assistant-Surgeon; Inglefield, who commanded the 'Isabella' and 'Phœnix,' with his officers Hills and Meara; and Jenkins of the 'Talbot.' The 'Investigator' was represented by Haswell, her old First Lieutenant, and the last survivor among the executives. Captain Austin's ship, the 'Resolute,' in 1850-51, mustered Robert Aldrich her First Lieutenant, Robert C. Allen her Master, and May and Cheyne who were then mates. Besides McClintock, the Expedition of Sir James Ross in 1848-49 was represented by Moore and Biggs. The Expedition of 1852-54, besides McClintock, Hamilton, May, and Cheyne, included Richards, Roche, Jenkins, Dr. Lyall, Dr. Toms, and Dr. Scott. The 'Herald' and 'Plover' mustered G. H. Allen, Hull, and Whiffin;' and Allen Young represented the 'Fox.' John Barrow, the old and tried friend of Arctic men, was also there.

Sir George Nares, as an old Arctic, was a mate in the 'Resolute' in 1852-54. As a young Arctic he was Captain of the 'Alert.' He forms the connecting link which ties together the older and the younger generation. With him were Stephenson and Markham; Aldrich, Beaumont, and Parr; Giffard, May, Archer, Rawson, Fulford, Egerton, and Conybeare; Colan, Ninnis, Coppinger, and Feilden; Mitchell, Cartmel, White, Miller, and Hodson; and Pirie of the 'Pandora.'

Thus, probably for the last time, a great gathering of old and young Arctic officers sat down together. Their united experiences spanned over a period of 58 years, and included almost every portion of the Arctic regions. Old and young alternated round the table, reviving old memories and associations on the one hand, and hearing the details of the work, based on their traditions, which their young successors had so recently achieved on the other. There was a complete interchange of feelings and experiences, a warm and cordial amalgamation, and amidst most interesting conversation, young and old Arctics became one brotherhood. When Sir George Back rose to deliver his eloquent and admirably conceived speech, the fusion was complete. He spoke of the difficulties of the work, of the valuable results, of the ability, tenacity of purpose, and gallantry of the young explorers, and when he concluded, such rounds and rounds of British cheers were sent forth as left no doubt of the verdict of the old Arctics. They have pronounced their opinion emphatically. The young Arctics who are now to the fore—Ready, ay, ready—are their worthy successors.

That it may not be long before fresh opportunities are offered to them to repeat their former brave and gallant deeds, by a renewal of Arctic exploration in a new direction, is the hearty desire of their Arctic brethren, of the Navy, of geographers, and of all true Englishmen who regard the honour and welfare of their country.

SKETCHES OF LIFE IN GREENLAND.

V.

The Moravians.

Being aware that I have more than once mentioned the Germans, I think it is time to enlighten you further about them. "The Germans" was the term in daily conversation applied to the Moravian missionaries alike, whether they happened to be from Switzerland, Prussia, or some Danish province; Germans we also called the Greenlanders belonging to their congregation. Their place, situated to the left of our colony, was called New-Herrnhut, as already mentioned. We were on very friendly terms with the missionaries, and often on holidays we visited them in large parties, but most frequently the ladies of Godthaab called alone with their children, and often returned much benefited by some piece of domestic advice from the well-informed elderly missionary-wives. I liked all the Moravians very well, and the becoming cap of the ladies made a favourable impression on my young heart. Some time elapsed before we ventured to become familiar with them, yet, by and by, we got on pretty equal terms, probably partly because of the return to Europe of the elderly people, who were succeeded by younger and less grave ones. But with the modern people, alas! the bewitching little headgear soon vanished, and was only seen on holidays and church occasions. The time generally chosen for these excursions was directly after our early dinner—I think what you call in England "after lunch."

We could reach New-Herrnhut by different ways, one leading across the hills to the left of Godthaab, the other through the valley; and, finally, the third path was seawards, round Cape Noûk, but by this one we very seldom went. In the summer, and when going in larger parties, we, at the same time, delighted in the beautiful walk, and we then used to stroll slowly along the vale-road, first crossing a little moor, across which some unknown philanthropist had thrown a row of very uncomfortable stepping-stones, that could, of course, only be passed by one person at a time. When happily landed on the dry heather, we sauntered along the eastern hills, the children, in the happy feeling of liberty, always running in front, and, like little dogs, making the distance twice as long as necessary. We often stopped either to look for a flower, or to catch some sounds from the distance, or to make out who the lonely hunters were coming down the hills yonder; sometimes we did not go straight on, but made a round to the Devil's Cleft, to try the echo there. But let us rather leave it behind now and continue the right way; we glance at the brown "Malenes" to our left, and the lofty glacier of the Antlers, and then again look back for the children who were bringing up the rear. The nurses are seen standing upright, but the urchins are all down on their faces to drink of a rivulet, whose clear waters did not so much excite their thirst as their fancy for indulging in a national custom: our children quite delighted in aping all the Greenland customs, of speech, manners, and gait; the boys acting the part of young kayakers and huntsmen, by imitating their gestures and using the terms peculiar to them; the girls adopting little coquettish ways of the most fashionable young females (if you fancy the Greenland girls quite artless, you are greatly mistaken). In the meantime, as we have not yet entered the house of the Moravians, let us rather return to the colony, and consider this promenade as an every-day's walk in our own environs.

In spring it always was most alluring to me to cross over to New-Herrnhut, because of its being next to impossible for me to remain in the house on a spring day, when all nature seemed to awake after the long winter rest. On such days I could do no work; and having paced the "Langelinie" for hours, I at length used to get ashamed of letting the colony see how idle I was; but indoors I could not stay, so I took the mountain-path to Germany, the valley being impassable, because of the deep snow melting and forming a perfect deluge there. It was, however, difficult enough on the rocks, but as the Greenlanders were all active at that time coming and going, I considered myself quite able to do the same. On the hills it was all very well, but before reaching the house one had to cross part of the plain and that might be impassable. But enough! I succeeded, and was admired by, and rewarded with the hearty welcomes of, the missionaries, who regaled me with coffee and cakes, and their wives supplied me with dry boots and stockings, whilst mine were being dried in the nursery—a separate house in the Greenland fashion, where all the servants of the brethren live as sisters: how sisterly I cannot say! I did not stay there long, though the inviting comfort and snugness of their little parlour, filled with the scent of the blooming gillyflowers in the windows, was not a little tempting. I got as wet as before on my way home, but it is no sacrifice on such days in Greenland to spoil several pairs of boots. Oh, the gentle spring! how I welcomed it, though no tree was budding. (I never missed the trees.) The snowbare mountain-tops with the innocent, sometimes very scanty, flowers, the delightful sunshine on the calm ocean always spread before us, the harmonious sounds of the falls and streams bursting their wintry confines, the fresh grass peeping through the last remnants, even the yellow oasis with the withered straw from last year, are all to me alike lovely substitutes for richer verdure and vegetation—all alike proclaiming the omnipotent, all-loving Providence.

It is spring-time now here in Denmark; and as I sit recalling the Greenland spring in general, and that day here alluded to in particular, to my mind, I am disturbed by the cries of our fish man, and a woman with shrimps, who are trying to outdo each other, one would think; and I wonder whether at some future day, the spell of bygone days will ever be able to draw a magic circle round this recollection, as is the case when I now look back on my kayak fishermen in the Gulf of Godthaab? I cannot easily fancy that. I sit down to have a look at the beautiful view of the sunny gulf with these national characteristics, and the swarms of noisy spring birds. From the Northland opposite I hear an incessant shooting going on, for it is just now the time when the eider-ducks migrate; they are caught in abundance by the young men, who at this season leave early in the morning for the Northland and other places, to return in the evening with rich prizes. We shall meet them on Langelinie on our evening promenade, and, for instance, ask "*Kasserarp it Epha?*—How many have you got to-day Ephraim?" "I have only got six, but Cali has been more fortunate and has got thirty;" adding, "Do you want some?" "Oh, yes, thanks, could you spare me a couple?" Epha was the son of our cook, and they were both very attentive in offering us national provisions.

But I have digressed too far from my main subject, for I have decided upon making the regular Moravian tour on a winter-day, only I am unable to prevent myself from still returning to the dawning spring. Let me just peep inside our garden, where our children, with some Greenland playmates, are playing summer games, building houses of our window shutters, and furnishing them with part of their toys—Greenland fashion, of course; again let me listen to the rippling sounds in the moss, to the chirping of the graceful little snow-bird and the "kousagtak," both pass-birds of the spring—listen to the welcome tumbling noise of the lavines in the thaw sliding down the roofs; let me give a nod to some passing-by deformities with their faces and upper part of their bodies hidden, not exactly by the forest of Birnam, but something in the same style—women nearly invisible through the immense bunches of heather and branches they were carrying on their back!—and let me still give a nod to Mads, not the young husband mentioned in a former chapter, no! old Mads, the kind patriarch of our goats. Even the flock comes down the road looking still a little drowsy from their long confinement in the stable, and having some trouble in wading through the soft snow. After this I shall at once transform the aspect of Godthaab and New-Herrnhut to that of winter, though rather unwillingly, I confess. Say on a day in February.

When a trip to Germany was decided upon, the first step was to send a message to the cottages of the nurses, if they were not present, to let them know our plans; then they would soon reappear smartened up with new boots and smartly arranged handkerchief round the forehead, waving coloured ribbons, and bows over the upper part of their boots, and red cuffs drawn over their small hands; and, accustomed as they were to these expeditions, they attired the children to their own taste with new aprons, dressed their hair a little, and if in winter, as to-day, put on their skin clothes and gloves. In fancy, I see many a dear face of our several servants, but I let the before-mentioned Louise, our old acquaintance from the country-trip in the Kangerdluarsuk, maintain her place in our service. (She is now married to a young man from Godthaab; they call him Arkaluk; he is the sole printer in Greenland, having been taught this art in Copenhagen; and Louise is still, it is said, a pretty woman, though she now has four children. The day she called to see me, Mrs. I—, the clergyman's wife, with her children and sister-in-law were waiting outside. She certainly was a very pretty girl. Her father was a Dane, the old captain of the Godthaab yacht; her mother the stout Ane Kattra, whose father also had been a Dane. The nurse of the minister's children was Juliana—Nona the little ones called her; she was a nice girl too, but quite a different style from Louise; she was the sister of Arkaluk, so at present sister-in-law of her former fellow-servant and friend.)

So we started; but first we had a little consultation as to the road we should take. "*Sukkut ingerdlassavise?*—Which way?" asked the girls. We knew before that they themselves preferred the mountain-road, so we also gave it the preference. Down the colony road we went to the first rather steep ascent, after which the road was quite even and smooth across the tops until it descended to the level where the great triangular building of the Moravians was situated—the red wing with the white chimneys, and the black wing with the belfry. Of course we had not chosen a really bad day for our excursion, but still it was far from being a fine day; it was cold and windy, and the last still unfrozen snow-waves were slowly undulating before the east wind, and carried into the real sea below. The garden of the missionaries, at other times green, now lay deep buried in the snow; hungry ravens—after the usual tourist style, they ought to be ragged and setting up dismal croakings, but my ravens shall be in conformity with truth, smooth-coated, glistening black, but hungry. I cannot deny they must have been a little unhappy, to judge from the restless way they were flapping their wings, hopping to and fro, up and down, in the hope of finding some remnants on the dunghills. Everywhere you turn your eyes you see no other colours than black and white; the sky and the sea on this day hardly excepted, the heavens being cloudy and the sea very dark blue. To complete the wintry aspect, I must mention the half-open courtyard of the Moravians, with the sun casting its very feeble rays on the splendid but thoroughly wintry icicles hanging down from the roof perfectly dry; a beggarly-looking old frogfish fisher, probably as hungry as the ravens, is crossing the place on his way to his very humble turf cottage, that is as dear to him as a marble castle.

But let us have a look at the same place on a summer day: the same sun is sending other rays, that have thawed away not only the icicles, but make the tar trickle down from the roof and fall to earth in drops, to the immense joy of the urchins who are always haunting these precincts, always tolerated, although not always wished for; the ravens, of course, have disappeared—the garden awakened to new life after its long slumbers; instead of the icy beach, the rocky beach with its myriads of pebbles; instead of the dark blue ruffled sea, there is the light blue sea, with the gay kayaking life going on. But winter it now is, and the sharp bite of the east wind makes us bury our heads in our furs, as did the old frogfish fisher, though we being so much better off than he, as we are soon to sit down snugly to some warm drink. There we are at length, seated on the long sofa of seal-leather, with the plain little table before us spread with the whitest of cloths.

With the president of the missionaries we stopped oftenest. He was a very talkative man, Mr. H—, who knew well how to entertain his guests; he had travelled a good deal in his younger days, and had a lively temperament and a good memory. The rooms—the little low rooms I liked so very much, furnished as they were in the simplest of styles, with the plainest of furniture, and little pictures of German towns with gay green gardens and many-coloured houses. Under the diminutive looking-glass between the small windows hung the scripture text, "*Sei still und warte des Herrn*," glazed and framed. At first sight, childlike as I was, I regarded it with about the same awe as I did the ladies' "caps," but not as in any way concerning myself; but later on I came to look at it with other feelings, and considered it a nice and profitable custom to have such a visible monitor. On the whole, there was in these little rooms much to excite my fancy: Mr. H— also possessed a little collection of steel engravings, called "the little universe," and this led the enthusiastic travelling spirits all over the globe: from St. Paul's across to St. Peter's, and from Venice to Genazareth; and I always delighted in making the journey. Mrs. H— brought the coffee. The children, radiant with delight, were placed at the children's table, spread with cakes and the holiday playthings of the German children; and afterwards they always had a cornet, with sweets which the father drew forth amidst great glee and exultation from sundry nooks and corners in the room, from little secret places in the cupboard, and from drawers in the likewise red-painted beams of the ceiling. When tired of being indoors, the children ran to play at "hide and seek" in the church—"*der Saal*" they called it; this was as dull and dreary a room as their habitations, on the other hand, looked cheerful. There were some very primitive benches for the congregation, a plain little table for the missionary when he officiated; finally, an organ and some old bassoons, whose out-of-tune sounds the charm of memory changes into sweetest harmony, as I write this down. We were surprised that the Moravians, otherwise so devout, used their "*Saal*" thus ordinarily; the children, however, enjoyed their privilege unscrupulously, till they were called away to be dressed. The nurses also were sent for at the servants' house, and sent off with them in front,

Towards evening the east wind often abates. We had to-day looked forward to that possibility, and we were not disappointed. After many thanks, requests to come again soon, which were returned in like manner by us, we took leave, and ascended the hills in high spirits, as usual. The heavens were quite serene and calm; nothing but the dark sea reminded us that there had been any wind; the church-bell for evening prayers at the Moravians reached us the moment we prepared for the descending to our own parts; and once more I have a picture of peace before my mind's eye. Twilight had come on, and the light shone out from many houses, and from above the mild stars looked down on our little illuminated town. The colony was still all astir: young people running up and down the flagstaff-hill, to try and form an idea of what the wind and weather was going to be on the morrow; some Europeans take their evening's walk, the colonists stand smoking their clay-pipes in front of their houses, and the imperturbable "*neviarsiats*"—young maidens—were promenading, psalm-book in hand, probably keeping time to the tune of some lively "*arfenik pingasut*," a species of Scotch reel (their favourite dance).

Our children, who had had the advantage of the start, came running to meet their "*ananas*" (mothers); and, a little tired, we now sauntered to our houses in the uppermost part of the colony; near our house we took leave of the clergyman's ladies, and after having spoken a few words with Elisaus, whom we met coming from his evening's visit to the stable, we also entered. The constant topics of Elisaus and myself were milk, meat, and other culinary points; but to-night we all admired and wondered at the distant golden streak over the dark blue sea, and the Cook Islands on the horizon. S. N. R.

INTERNATIONAL EXPLORATION OF AFRICA.

The Share of Portugal.

(From the "Journal de Commercii," No. 6904, of the 11th November, 1876.)

The general outline of the course to be pursued by our Government in this proposed expedition has been already given with that good sense and completeness characteristic of the efficient Secretary of the Geographical Society of Lisbon. On this point there is nothing to add. We will therefore confine ourselves to what suggests itself to us from the practical standpoint we occupy.

By a glance at any map of Africa it is apparent that the rivers running furthest into the interior towards the north and south limits of our two principal possessions on the two coasts, Angola and Mozambique, are: on the one side the Quanza and Cunene, and on its northern extremity the Zaire, and on the other side the Zambese. The vast region extending between these two widely distant limits, replete with natural riches can, by means of those large arteries, be brought into communication with the outside world, and be made to receive in exchange for its ivory, its gold, and all the other raw materials with which it abounds, the produce of European industry, and the light of civilisation it now lacks. Rivers and navigable canals are the cheapest as they are the most convenient communications in all countries, and they are therefore the ones that should be first utilised.

The Zambese has already been explored throughout a large portion of its course. Livingstone's journal will be a valuable guide for any further explorations. On this side the route to be followed is already laid down. What we have now to do is to profit by the work that has been already done to complete what is wanting, and to carry out effectively whatever we propose to do. Starting from the Zambese by its principal affluents on either side, we must, by successive marches, arrive at a knowledge of the country through which they pass, and go on establishing posts or commercial centres wherever they may be most convenient. We shall thus advance from station to station, ever gaining fresh ground, while at the same time we should penetrate into the interior until we reach the Chobe, the Longo, and the other confluents to the west of the Zambese. The first, and the one that appears to be the most important, would conduct us to the neighbourhood of the Quanza, and to within a relatively short distance of the Cunene.

This projected exploration must, however, necessarily be harmonised with whatever plan may be decided on for the western region on the Angola side. On this side there are two routes open to us to follow, that of the Quanza and that of the Cunene. The Quanza is perfectly well-known up to east of Pungo Andungo; some steamers plying on its waters carry on a regular service for the transport of goods between some of its inland waters and Angola. It is only now necessary to explore its upper course, where it is almost entirely unknown. The Cunene is only known at its mouth and between Humbe or Dongoena, and Hunga in the interior, as far as Mullondo. If we were to be told that it was intended to carry out the explorations of these two rivers simultaneously, we should have no objection to urge, but still it appears to us rather too much for a Society to undertake, which is still quite in its infancy.

The Quanza is known and navigated throughout the largest or best part of its course, and already renders important aid to commerce and agriculture in that region. The Cunene may be made to do a similar service, if it is explored, at least as far as Humbe, that being the point where its exploration was abandoned, although the Government has since then ordered it to be continued.

The Quanza is at its source in close proximity to the Cubango, or the river to which this name is given, and which is supposed to be a confluent of the Zambese, and it may be possible at this point to get an inland communication with this latter river. This may also be done, even under more favourable conditions, with the Cunene. For example, the region in which the sources of these two or three rivers are met with is an extremely mountainous one, and inhabited by natives of a rough and turbulent disposition, and communication there would be always difficult. On the Cunene side, however, such communication could be made much further to the south, thus avoiding these disadvantages, both as regards the mountains and the warlike proclivities of the natives. But that which decides the preference to be given to the exploration of the Cunene, above all else, is the fact we first noticed.

The Cunene, which is the natural channel of communication between the vast and rich regions of the interior of Mossamedes, runs from its mouth up to Humbe through a most fertile and healthy country, where European agricultural settlements might be formed, a fact which gives it a special importance, and one that has hitherto been overlooked. The Cunene has not a very accessible bar, neither has it a safe port for vessels proceeding there. But at a distance of about 6 or 7 leagues to the north there is the ample and magnificent "Tigres" Bay; and a road between these two points would remedy everything. With the occupation of the Cunene, the establishment of the district capital of Mossamedes would follow there in a short time. The distance from the mouth of the Cunene to Humbe is at most 60 leagues; from the town of Mossamedes, by the way now used, it is from 90 to 100. It is possible some obstructions may be met with, such as cataracts or rapids (the Zambese has some), in some point or other in the stream of the Cunene; but it is also probable that in the rainy season, when there is more water, those obstacles would be so far covered as to offer little difficulty to navigation: but given the existence of these, the remedy would still be very easy by breaking the navigation at such points, and continuing it higher up, as is done in other parts under similar circumstances. From the mouth of the Cunene as far as Humbe, the country inhabited by the Muximbas or Baximbas would have to be crossed. These people are very intractable, but at the same time not very aggressive. They were expelled by the English, more south, from the neighbourhood of Walvisch Bay, without much difficulty.

The first inhabited parts met with on the banks of the Cunene, before reaching Humbe, are Dongoena and Hunga; thence, or even a few leagues before it to beyond Mullondo, the Cunene runs through a fertile and inhabited plain, covered with trees, and on the river banks is most beautiful. From Humbe towards the interior in an approximate S.E. course, and for a distance of about 100 leagues through tracts already formed—which could be shortened to a little over 70 as soon as it became possible to follow a shorter course—the river known there as the Cubango is met with, which from Quangari, the first land it crosses on its right bank, runs in an E.S.E. direction as far as Mucusso or Bocusso (it is also called Xiloto), the extreme point on the same side of the river to which the black travellers from Benguella or Mossamedes come (that is, from the inland points of Quillengues, Gambos or Humbe), who go there to buy ivory.

The journey from Quangari to the Mucusso in day stages is as follows:—From Quangari to Bunja, two days; from Bunja to Sambio, two days; from Sambio to Derico, two and a-half days; from Derico to Mucusso, three days. A day's journey may be reckoned at 6 to 7 leagues. As we have to add to these distances the spaces occupied by the lands just mentioned, the total distance from Quangari to Mucusso may be calculated at 65 to 70 leagues very nearly. The Cubango, in passing through Mucusso, is so large a river that various islets or aits are met with in it, on some of which the "soba" and other members of his family reside.

Beyond Cubango in an easterly course, and three days' journey from Mucusso, is situated the Gange country, inhabited by a brave and warlike people, whose soba or chief, Xiquerete, in 1858, invaded the lands of Mucusso as far as Quangari with a large following, laying waste and destroying everything. The inhabitants of Mucusso give these people of Genge the name of Makakolos, probably the same people Livingstone calls the Makalolos. On the hither side of Mucusso, and towards the S.E., are to be found the Mundembendes, a very numerous nomad people, who render a certain homage to the soba of Mucusso.

We will now explain the doubts we entertain as to the identity of the River Cubango. Livingstone, in the maps accompanying the book containing his first travels into the interior of Africa from 1840 to 1856, gives the name Cubango to a river which, rising in the same mountainous region in which the Quanza rises, but running in an opposite direction, afterwards takes the name of Coquema, with which it enters the Chobe. In a parallel course, but separated from it to the south by about 40 leagues, Livingstone gives us another river, the Embara (Embarrach he wrote in his book), which discharges into Lake Ngami. Between these two he makes the River Cuanamare to run, which discharges into the Coquema.

It should be noted that Livingstone places the Derico (Darico he called it) on the right bank of the Coquema, a little above where it receives the Cuanamare; if this particular be correct, Mucusso should be found distant only a three days' journey or about 18 to 20 leagues to the S. or S.E. of Derico. Instead of this we find Mucusso shown on the banks of the Embara 40 leagues distant. Mucusso is indicated by the collective name of "Balibebes," which means those of Libebe or people of Libebe, such being the name of the "soba" of Mucusso, when Livingstone passed within a certain distance of those places, and which we ourselves found to be some 80 leagues distant towards the interior of Mossammedes. Which of these two notes is correct, that of Derico or that of Mucusso? It may be neither, but if it is the first, the opinion of those who consider the Cubango to be the Coquema or Chobe is correct. If it is the second, then the Cubango is the Embara. In the map of Angola, compiled by the Marques de Sa da Bandeira and Lieut.-Colonel Leal in 1853, it is seen that the first hypothesis is the one there accepted. We hesitate. From information obtained of black travellers who have gone to Mucusso, we should be inclined to believe that the Cubango is the Embara. But Livingstone says that the Embara is dry except at the rainy season, which prevents our holding to this conjecture. And the Cuanamare? May not this, perhaps, still be the river called the Cubango. The existing data respecting all these are so uncertain, and all that is known about them is so obscure, that the latter hypothesis could scarcely be rejected. The direction and situation of the River Cubango, in the map already referred to, do not merit much confidence, and it is also seen that the distances are not correct, as may be verified, for example, between the Quangari and Mucusso. At all events, starting from Mumbe towards the east, with more or less southing, the rivers forming the upper course of the Chobe should be struck. Communication with the east coast by the Zambese would thus be opened. In the case of the Mucusso being really on the bank of the Embara (and that this river is consequently the Cubango), its exploration would nevertheless be very important. The region it crosses is extremely fertile, abounds in primary materials, and appears healthy. Livingstone says that "all the country bordering on the desert from Rurumum to Litoubarouba, as well as the region extending to the north of Lake Ngami, is notoriously salubrious." The description he gives of some of these places, from a sanitary point of view, is seductive even to an European, and this circumstance is worthy of special consideration by any commercial or agricultural undertaking, either on the coast or in the interior of Africa. To carry out the exploration complete, from Humbe to Mucusso, and to the Zambese by the Chobe, fifty armed men engaged in Quillengues, besides the porters necessary for the transport of the baggage, would appear to us to be sufficient. From the mouth of the Cunene to Humbe, or *vice versâ*, the exploration could be made by some soldiers and some blacks in the State service, or natives of Humbe. The Muximbas would make no attempt to approach, seeing armed men. All the harm to be feared from them arises solely from the terror they are in lest their cattle should be forcibly taken from them.

Little is to be feared from the people of the interior, and we may here make an observation which appears to us to be relevant. Starting from the coast, as we approach the interior, the people met with—at least as far as Humbe, or even beyond that place—are progressively intelligent, and show a better state of civilisation and moral development at each stage. Thus, for example, we have the Bakuisses on the seashore inhabiting cavities in the rocks, either natural ones or made by themselves, who live by fishing or hunting, and are now in a condition very similar in all respects to the ancient Troglodytes. This race is divided into another group or family, the Baquandos, who live a little more inland, but nearly in the same manner.

After the Bakuisses, more towards the interior and extending throughout the lower and eastern region of the Xella range, come the Bakubales and other tribes of the same race, who possess herds of cattle which they pasture, and who are beginning to cultivate the land, although they are nomads, and without any really organised political society. Further still towards the interior, and occupying the high plain which extends from the top of the Xella in an easterly and southerly direction, are the Banhanecas tribes, still more intelligent than the Bakubales—husbandmen and shepherds, with a constituted political society, and with more civilised customs and usages; beyond these again, established principally on the right bank of the River Cunene, are the Muhumbes or Bankumbes, a more intelligent race than the others, with milder and better manners, more delicate tastes, and of a more agreeable society; beyond the Cunene the Banankutuba, more warlike and barbarous than the Bankumbes but more energetic, more laborious and industrious, the only people that carry on trade and practice different industrial callings, in which they are badly and to a limited extent imitated by the other races. The soba of Bale, one of the tribes comprising the above race, prides himself upon appearing dressed like a white man; he buys horses for riding, and has armed nearly all his people with guns; and the Bangangellas, one of the tribes farthest from the said race, is governed by a woman, and is the most industrious set of people known. Finally, going further towards the interior we find the soba of Mucusso, who always presents himself wearing at least a coat or cloak, and the soba of Genge, who buys all such things as are used by the whites. Livingstone says that the inhabitants of that country, the Makololos, have an ardent desire for communication with the coast.

The language, or the different dialects, offshoots of the same language, which all speak, follows the same order of progression from the coast to the interior, at least as far as Humbe. As an exception or variation of the above rule there are some wandering tribes of a peculiar race which appear among the people, principally from the borders of the region inhabited by the Banhanecas towards the interior. These tribes are neither in their language nor in their habits and customs like any other people of this part of Africa, except perhaps the Bakuisses to a small extent, and the Baquandos. The individuals of this race are generally short and paunchy, of a mulatto colour, but presenting well-pronounced characteristics of the African race. Their language consists in the utterance of successive and almost inarticulate sounds, like raps given with the tongue against the roof of the mouth, and is not understood by any of the other people. Nothing of this nature could well be imagined more primitive or less human. They go almost naked, and use poisoned arrows. They live by hunting, and on honey and wild fruits, and only communicate with other tribes for the purpose of exchanging the teeth of the elephants they kill for tobacco or "bamba." They are known and are themselves called by the name of Bakankalas.

They are generally inoffensive, and we sometimes meet them between the Gambos and the Humbe, there being on such occasions no harm to fear from them. Between the Quanhama or the Caffima, however, and the Quangara, there is a tribe of them which attacks travellers not armed, if these are numerically small enough to plunder. Nothing is known of the origin of these people, neither are they able themselves to throw any light on it. May they not, together with the Bakuisses and the Baquandos, form the dispersed remnants of the great bushmen family which is supposed to be the aboriginal race of this part of Africa? We are disposed to believe this, and even more so, as we see Livingstone in his map, when wishing to describe the Bakankalas between Caffima and Quangari, writes: Karakeres or bushmen.

This article is already a lengthy one, and we must therefore conclude it. The importance of the subject, the urgency and necessity for the proposed expedition, and the advantages that must result from it, are convictions that are fortunately rooted in the consciences of all, and which we see unanimously shown by all. In giving publicity to what we thought and knew regarding this subject, we had only in mind the fulfilment of a duty. It is little we offer, but we have no more, and it is given with the utmost goodwill.

We had almost concluded this work when we read the article published in No. 6892 of this Journal, by Sr. Pinheiro Bayão. Thanking this gentleman for his kind expressions towards us, we are, on our part, constrained to declare that of all the persons who could contribute towards the successful issue of the projected expedition to the interior of Africa, none could do more so than Sr. Pinheiro Bayão, both by his intellect and patriotism, as well as by his special and practical knowledge, not only of the coast, but also of the interior of Angola.

Sr. Pinheiro Bayão, who has given so many proofs of his self-denial in the way in which he has served and discussed our colonial interests in the Press, would, we are sure, once again heartily dedicate himself, both with his intelligence and his personal leadership, to the completion of the most important, if, at the same time, the most arduous task that Portugal has undertaken for the benefit of her colonies. It would not be Sr. Pinheiro Bayão that would profit by this, but the country.

At all events, we express our earnest wish that such an enterprise may be realised with the aid of all who are in any way capable of supporting it, as an object which is alike interesting and honourable to Portugal.

GREAT TRIGONOMETRICAL SURVEY OF INDIA, 1874-75.

The out-turn of work by this department amounted to eighty-nine principal triangles, covering an area of 6416 square miles, in connection with which two astronomical azimuths of verification have been measured; of Secondary Triangulation, an area of 4049 square miles has been closely covered with points for the topographical surveys, and an area of about 6000 square miles has been operated in *pari passu* with the principal triangulation; of Topographical Surveying, 5525 square miles on the scales of one inch, two inches, and four inches to the mile. Of geographical exploration much valuable work has been completed by officers of the department on the northern frontier of Afghanistan and on the lines from Ladakh to Lhasa, and Lhasa to Assam.

The financial administration of the department during the year under review has been exceedingly difficult and embarrassing. A large increase of expenditure had been occasioned by the introduction of a system of consolidated salaries, and by the resumption of operations in Burmah. The orders for these measures were speedily followed by orders for large reductions of expenditure, which, according to present arrangements, are to be gradually carried out within the next three years by the stoppage of promotions, and a reduction of numbers as vacancies occur.

The revision of portions of the Great Arc south of Bangalore having been completed, the Madras party was deputed to start the Ramnad Longitudinal Series, which is to extend eastwards from the Great Arc and along the coast to Ramesweram, with a view to the proposed connection of the triangulations of India and Ceylon. The work of clearing "rays" between the stations was very slow, owing to the occurrence of belts of dense palmyra forest intermixed with groves of cocoanut trees, which necessitated the erection of the stations to a sufficient height, by means of lofty scaffolding. Major Branfill extended a succession of quadrilaterals as far as the land's end, utilising islets of coral reef which lie parallel to the mainland at a distance of from 4 to 5 miles. The connection with Ceylon will be completed, it is hoped, by next season. A curious instance of religious bigotry was exemplified in the refusal of some village priests to allow the *gopuram* or entrance tower (80 feet high) of the Tirupullani Temple to be used for a station, although Major Branfill offered to pay liberally for the use of it. He has drawn up a most useful alphabetical list of the proper names of the stations and landmarks fixed during the season, with the root-meaning. The vernacular form was ascertained on the spot, and this will, no doubt, prove of service in correcting the spelling in further maps and charts.

As mentioned in the Topographical Surveys section, Lieutenant Harman was deputed to join the Duffla Hills expeditionary force. His first triangulatory operations were confined to the country between Jorhat and Dibrugarh. He subsequently accompanied the field force as Major Godwin Austen's assistant, and made a reconnaissance of the Ranga Valley and the hill-ranges to the east of the tracts occupied by the force. He made good friends of the mountaineers, and after an absence of three months returned to his own party, but the extraordinary difficulties of the country prevented him from completing more than two triangles.

In British Burmah the want of proper topographical maps had necessitated the suspension of the Geological Survey, and as isolated Town Surveys were being carried on, and Marine Surveys of the coast were about to be commenced, Colonel Walker was requested to proceed with the triangulation vigorously.

The Brahmaputra party was reorganised and transferred to Burmah, under Mr. W. Beverley, who worked in the country to the south of Rangoon, while Mr. Mitchell, his assistant, who was transferred from the Eastern Frontier Series, reconnoitred the ground and laid out the triangulation north of Rangoon. The object was to lay out secondary triangles from the principal sides of the Eastern Frontier Series, in order to fix all the large towns, prominent and permanent objects, peaks, &c., in British Burmah for detail, and Geological Surveys, and lighthouses along the coast for the Marine Surveys.

Owing, however, to the unfavourable nature of the weather and difficulties of the ground, it was not possible to connect the two sections; this, however, was to have been accomplished the following season.

The Eastern Frontier Series have been extended in a S.E. direction to within 40 miles of the town of Moulmein. The same obstructions as had been met with in previous years—the dense forest and tropical vegetation growth, the sparse population, the reluctance of the Burmese to work for hire, and the practice of firing the grass jungles during the field season and so obscuring the atmosphere—all these circumstances combined to render a less out-turn of work than would have been attained elsewhere in India. The area amounted to about 3150 square miles, and the preliminary operations for future triangulation were carried over a distance of about 100 miles. One hill-station, Chaiteo, 3600 feet above sea-level, is described by Mr. Rossenrode as a very remarkable sight. It consists of stupendous projecting rocks surmounted by masses of other rock raised in successive tiers. Each of these rocks is crowned by a pagoda, the principal one standing on a rock which projects like a rhinoceros horn over a yawning precipice several hundred feet in depth. The Burmese ascribe, not unnaturally, the erection of these superimposed masses of rock to superhuman agency.

Captain Rogers's party extended its triangulation northwards through the Deserts of Jaisalmir and Bikanir, tracts which, though fairly inhabited during the rainy season, are deserted in the hot months owing to the failure of water.

The out-turn was very good, amounting to an area of 2472 square miles.

The topographical operations in Kattywar have been carried on under the charge of Captain Pullan, owing to Captain Trotter's engagements on duties connected with the Geographical Exploration beyond the British Frontier. The area topographically surveyed amounted to 1749 square miles, while preliminary triangulation was extended over 2200 square miles. On reaching the coast of the Gulf of Cutch a satisfactory junction was effected with the Marine Survey of that gulf, executed by Commander A. D. Taylor. This portion of the country lying along the borders of the Gulf of Cutch proved very difficult to survey on account of the treacherous mud banks and mangrove swamps which fringed the coast.

Major Haig was engaged during the year under review in carrying on a system of survey planned so as to combine the work of the Bombay Revenue Survey with the accurate measurements of the professional survey. This combined survey is on the scale of 4 inches for the British districts and 2 inches to the mile for the Native States. The area surveyed topographically was 1375 square miles, the out-turn being almost exactly double what it was the previous year when the operations were of a tentative nature, and the best method of utilising the Revenue Survey details had still to be ascertained. About 550 square miles were surveyed by Lieutenant Gibbs, in the Dang Forests, the Dang Hills being the first step of the trap formation leading to the Deccan table-land. Lieutenant Gibbs says that in the Gaekwar territory he was struck with the wretched state of the trees, especially teak, and that one might reckon on the core of any teak-tree over a foot in diameter being rotten, and the trees all misshapen. On working into the Dang States, the superiority in size, symmetry and healthy growth of the trees under the Forest Department strikes the untrained eye at once. A copious list of trees and plants is given by Lieutenant Gibbs, with the scientific name and locality.

The Surveyor-General of India having expressed very decided opinions against the expediency of using at all the Bombay Revenue Survey work for geographical purposes, a conference of Survey and Engineer Officers was assembled by Government to report on the whole subject, including the question of scale, but, owing to the divergences of opinion, no report could be agreed on. Under these circumstances Government ordered the adoption of a medium course, and directed the employment of the 2-inch scale and the utilisation of the Revenue Survey maps.

The Surveys in the Dehra' Dun and the Siwalikhs are being carried on conjointly by part of the Kumaun and Garhwal party, under Captain Thuillier, who is surveying the non-forest tracts and by the newly formed Department of Forest Surveys, under Captain Bailey. The areas topographically surveyed by this combined party were 225 and 288 square miles respectively, the ground, particularly in the interior of the Siwalikhs, being very broken and difficult to delineate.

During the rainy season of 1874 a detachment from Captain Thuillier's party under Mr. Ryall was located at Almora, with a view to make the most of the short interval between the cessation of the autumnal rains and the setting in of winter weather. The out-turn amounted to 2176 square miles, and the portion of country triangulated in advance covers 800 square miles. Much of this work required all the skill and nerve of the surveyors, owing to the great height of the mountains; Mr. Pocock's work, particularly in the upper part of the Mana Valley, lay above 21,000 feet, the maximum height reached being over 22,040 feet above sea-level. There only remains now 1200 square miles to be completed, but, operations in these desolate and inaccessible regions being expensive, their further progress has for the present been postponed.

The spirit levelling operations in the Madras Presidency were undertaken by Captain McCullagh (*vice* Lieutenant Harman, transferred to Assam) who carried his work from the S.W. end of the Bangalore base to Bellary, and thence to Raichore Railway Station, a total distance of 297 miles. At Bellary a junction was effected with the line of levels which had been carried from thence to the Port of Karwar in the preceding season. There was a discrepancy of 4·5 feet: this will probably be eliminated when the mean sea-levels at Karwar and Madras have been exactly determined.

The determinations of mean sea-level in the Gulf of Cutch, commenced in 1873 and continued up to the year under review, were undertaken as a first step towards deciding whether progressive changes are taking place in the level of the land at the head of the Gulf, as has long been supposed to be the case. It is proposed that the operations shall be repeated at the same points a few years hence, and the comparison will show what variation has occurred.

At Okha the breaks in the continuity of the registration were very short and of no importance; at Hanstal they were more numerous and longer, the water being here muddier and causing more sediment. Owing to the trying nature of the work of inspecting the stations during the monsoon, the registration was continued to within a few days of the commencement of the monsoon, and the stations then dismantled, the cylinders being surmounted by cairns to serve future identification. The first series of operations to determine the relative changes of land and sea is thus now accomplished.* From the combined tidal and levelling operations preliminary results have been obtained, showing that the mean sea-level is higher by 7 inches at the head of the Gulf, and by 4 inches midway up, than it is at the mouth of the Gulf.

During the year 1875 the tidal observations taken in 1871-72 at Tuticorin had been reduced by the harmonic method by M. E. Roberts of the Nautical Almanac Office, and mathematical expressions have been deduced by which the height of any tide may be computed with great exactitude.

In consequence of Captain Herschel's absence from India, and of Captain Campbell being deputed to assist Colonel Tennant in the operations connected with the transit of Venus at Roorkee, the determinations of longitude by the electro-telegraphic method have been suspended during the year under review.

THE ABBÉ DESGODINS ON TIBET.

SEVERAL contributions from the pen of the Abbé Desgodins, on the subject of Tibet and Indo-China, have appeared in recent numbers of the *Bulletin of the French Geographical Society*. The Abbé Desgodins' position, as missionary at Yerkalo, has afforded him opportunity of acquiring knowledge respecting the still obscure geography of the region between India and China. He asserts positively, from his own observation, that the two mountain-chains which separate the basins of the Kinsha or Yang-tze, Mekong, and Salwen from one another, are totally distinct from the Himalayas system. To the west of the Salwen lies another range, which may possibly be connected with the Himalayas, and which probably form the watershed from whence the Irrawaddy springs. The Abbé hazards a conjecture that the western range referred to is a continuation of the mountains which bound the Tibetan plateau on the north, and turn sharply round to the south about 95 E. longitude, and that the two other ranges start from the boss or mass mountains to the south-east of the great Gobi desert.

Tibet, which the Chinese call Si-tsang, is called Po-yul in the indigenous tongue, and has been divided into two parts, Tu-pu and Mu-tu (Upper and Lower Tibet). Before the Chinese conquest in 1720, Tibet was bounded by Great Bokhara on the west, and included Sikkim and Bhutan, besides the north-eastern portion of Yunnan; while on the east it reached the mountain-chain running along the left bank of the Ya-long-kiang, and in the northern part of the valley included eighteen Tibetan chieftainships, as well as the territories of Ba-thang, Lythang, and Kinchuan or Serkha. But after the Chinese conquest, though the limits remained unaltered on the north, west, and south, the three territories and eighteen principalities above-named were withdrawn from Tibet and placed under Sz-chuen; and A-ten-tze and Chong-tien were relegated to Yunnan; and the eastern frontier of Tibet, which became tributary to China, was fixed as the water-parting of the Lan-tsang-kiang and Kinsha-kiang as far as 29° 30′ N. latitude, and in its southern portion, the water-parting of the Lan-tsang and Lu-tze as far as 27° 30′ N., where it joins the eastern prolongation of the Himalayas. But all the territory comprised within the above-named limits was not left subject to Lhasa, for several Tibetan principalities, such as Sakiagung on the west, Po-yul on the south-east, Chra-ya, Cham-on-to, Siling, and others on the north-east were placed under the direct rule of a Chinese mandarin at Lhasa entitled *Itsin*. It is not until recent years that these limits have undergone modification; Ladak, Sikkim, and Bhutan are now more or less emancipated from Tibetan control.

The Abbé remarks further that though Tibet has lost territory to the west and south, she has gained Degue to the north-east (in 1863-4), and that the apathy of the Peking Government and the corruption of its mandarins in Tibet may lead to Ba-thang and Ly-thang being eventually recovered by Tibet.

After some remarks on the mountainous character of Tibet, the structure of which he compares to a large sheet of crumpled paper laid on a table, the Abbé turns to the mountain-ranges, and observes that, in his opinion, the Himalayas cannot possibly extend beyond 94° or 95° E. longitude, as the two ranges between the Kinsha and Lan-tsang, and the latter and the Lu-tze, run without interruption or ramification from 34° or 35° N. latitude to the southern extremity of the Indo-Chinese peninsula, and form an effectual bar to any transverse prolongation of the Himalayas.

No missionary or European has ever penetrated to the west of the Lu-tze, but Desgodins is nevertheless of opinion, judging from native report, that there is a third range running north and south-west of the Lu-tze. The traveller from Cha-mon-to (about 32° N. latitude) to Lhasa crosses, first of all, the range separating the Lan-tsang and the Lu-tze; then the last-named river by a wooden bridge, built on stone piles, at a place called Kiag-yu-kias by the Chinese, and Yel-ye-sam by the Tibetans, then proceeding towards Lhasa, he passes over a high mountain-range running east and west, at the village of La-ly (Tibetan, La-re-go). This range bounds the independent territory of Pomi or Po-yul on the north, and then turns southward on reaching the right bank of the Lu-tze, and separates Pomi from Dzogong, which embraces territory on both sides of the Lu-tze and its tributary the Oo-kio. The same range occurs again between 28° 30′ and 27° 30′ N. latitude.

With regard to the range crossed in journeying from Cha-mon-to to Lhasa, the Abbé is unable, for the want of sufficient information, to identify it with the Kuen-Lun or any other range.

---

* The final reduction of the registrations is being now (January 1877) carried on in England.

Turning now to the rivers, the Abbé says he was, at the outset, a believer in the identity of the Brahmaputra and Irrawaddy. But native information, supplied to him at various periods between 1864 and 1874, convinced him that this was an error. Several natives informed him that after leaving Lhasa they had followed the valley of the Yarkio-tsang-po (Brahmaputra) as far as the country of the Lhopa or Slo (Abors) savages, and that the river flows in a southerly direction through this country, breaking through rocky mountains, which are ascended and crossed by ladders, as, owing to their excessive steepness, there is no route alongside of the stream. The volume of water was great, and comparable with that of the Lu-tze.

A slave from the Mu-ua country told the Abbé that, having gone to Assam for trading purposes, he was taken prisoner by the Mishmis, and by them sold to the Tibetans, from whom he was rescued by the missionaries of Bonga. He gave similar information with regard to the junction of the Tsang-po and Brahmaputra, but the name he applied was *Dehon* to the portion of the river in the Lhopa mountains, showing that he must have heard it called Dihong. Another important fact ascertained by the Abbé from a large number of natives, who all agreed on this head, was that in the belt of country between the Mishmis and the Lu-tze—a tract of about twelve or fifteen days' journey across—no stream of any considerable size occurs. The Yarkio-tsangpo is thus manifestly identical with the Brahmaputra.

From the foregoing, it follows that the Irrawaddy must rise south of latitude 30° N., and native information corroborates this, and makes it receive a minor tributary from the east. The Salwen (called Ngen-kio in Tibet) rises in the mountain-chain which separates Koko-Nor from the north-eastern part of Tibet, passes through Dzo-gong or Tsa-ua-dzong, and then separates Burmah from Siam, the lower portion of its course being well-known, Near Mekong, between 28° and 29° N. lat., the Lu-tze receives from the east a tributary, Oo-kio, which is to be found on no map except that of Delisle (1723). The Oo-kio rises about 31° N. latitude.

The Mekong or Lan-tsang rises about 33° or 34° N. latitude in the Kuen-Lun range near Koko-Nor. Its two branches have their confluence about the 30th parallel north of Cha-mon-to or Kiamdo, and it then traverses the provinces of Chra-ya and Kiang-ka, before entering Yunnan. About the latitude of Cha-mon-to the rivers are distant three or four days' journey, and below Yerkalo this interval is reduced to two.

The remainder of the article is occupied by an elaborate criticism by the Abbé Desgodins of the work of the French Expedition up the Mekong, to which, in spite of several errors in their account of the geography of Indo-China, he awards a warm tribute of praise.

Our readers will find the map accompanying the *Bulletin* for October 1875 the best one with which to follow the Abbé's account of Tibet and Indo-China.

Reviews.

—:o:—

SCURVY IN HIGH LATITUDES.*

The outbreak of scurvy in the late Arctic Expedition is an event of such interest in itself, and is geographically so important as affecting future exploration, that we need scarcely apologise to our readers for bringing this pamphlet to their notice. The views of Dr. Black were communicated to the *Times* in a letter which was published on the 1st of December. A second letter was sent on the 8th of the same month, but was not inserted. For in the interval the *Times* had, in a leading article, committed itself to the assertions that the sole cause of scurvy was the want of vegetable juices, that the sole preventive was lime-juice, and that there was no instance of scurvy breaking out when lime-juice had been regularly administered. Not satisfied with thus committing itself, the *Times*, in another article, alleged that in former Arctic Expeditions the sledging-parties always took daily rations of lime-juice, professing to base this assertion on official documents. Admiral Ommanney, Admiral Richards, and Dr. Scott, officers against whose evidence there could be no appeal, at once testified to the absence of truth in the assertions of the *Times*.

Dr. Black, who has now published his two letters in the form of a pamphlet, is physician to St. Bartholomew's Hospital, and was for many years physician to the old 'Dreadnought;' so that there can be few medical men who have had wider experience of the treatment of scurvy. We, of course, are unable to give an opinion on the correctness of his views; but the intolerant dogmatism of the writer in the *Times* naturally creates distrust; especially as we know that, in many instances, scurvy has broken out in spite of the regular administration of lime-juice. Indeed the late Arctic Expedition is a case in point. Dr. Black's position and long experience entitle his views on this subject to respectful attention.

His argument is as follows:—Vital heat and energy are the results of consuming oxygen, and their existence requires that the temperature of our bodies should be maintained at about 98°. In extreme cold this can only be done by the consumption of large quantities of heat-giving food. The Eskimo keeps himself up to 98° by eating blubber. His temperature is not higher than ours, his work is not greater. The pounds of seal-fat he consumes go out of his body in breath—that is, in water and carbonic acid. It is this combustion of his food which has kept up his temperature, whilst his body at the same time has maintained its integrity. By his breath he has taken in just so much oxygen as has sufficed to burn the oil which is required to do his mechanical work, and keep his body up to 98°. The amount of oxygen which is necessary for him to do this is the exact amount which is necessary for ourselves in the same conditions. Dr. Black then remarks that a cup of lime-juice will not satisfy this demand; that it will utterly fail to meet the claims of so much oxygen as will convert a bladder of lard or a gallon of oil, into its equivalent of water and carbonic acid. He maintains that the doctrine of anti-scorbutics is utterly rotten and untenable, the last remnant of a bygone and obsolete physiology. There is no anti-scorbutic, or rather all food is anti-scorbutic though in most unequal degrees. Fat and oil stand at the head of the class. Sugar has a high place in the scale, containing 6 lbs. of carbon in every 15 lbs. Potatoes rank high on account of their starchy elements. Lime-juice stands very low indeed, and is about on a level with toast and water in keeping scurvy at bay. Take a puncheon of lime-juice, evaporate it to dryness, weigh the residue, burn it, reduce it to ash and carbonic acid. The quantity of oxygen it has taken to do this, a decimal of a grain, represents the anti-scorbutic virtue of lime-juice. As we understand Dr. Black, scurvy is caused by any conditions which prevent the body from being kept at a temperature of 98°; whether it be bad or improper food, insufficient quantities of food, intense cold, or any other cause having this effect. The prevention is secured by supplying food of the kind and in the quantity that will ensure the required effect; and the cure of course depends on the same means. Administration of lime-juice, when scurvy has been prevented or cured, may have been accompanied by such increase of food, change of diet, or other health-giving conditions, as at the same time to furnish the real preventive or cure. We know certainly that lime-juice alone, even when most regularly administered, does not prevent scurvy.

---

* *Scurvy in High Latitudes*: An attempt to explain the cause of the "medical failure" of the Arctic Expedition of 1875-76. By Patrick Black, Physician to St. Bartholomew's Hospital. (Smith & Elder, 1876.) Pamphlet 8vo., pp. 16.

A RIDE TO KHIVA.*

It was a strange whim that took Captain Burnaby to Khiva. He learned that the Governor-General of Turkistan had absolutely prohibited the admission of Englishmen into the province, and that one had already been turned back by the authorities, who had attempted a journey in that direction. The effect of this upon Captain Burnaby was just the reverse of deterrent. Having been disabled by illness in 1873, when he had made up his mind to go to Khiva by way of Persia and Merv, to witness the invasion of Khiva by the Russian troops, the enigmatic veto of General Kaufmann put it at once into his head, when he was looking out of a window on the White Nile, to carry out his project forthwith, jumping even through the paper hoop of Kaufmann's prohibition. Captain Burnaby did it this way: He proceeded to St. Petersburg and negociated directly with the Minister for War, who after long delay acquainted him that the commandants in Russian-Asia should be instructed to aid him in his journey, but that acquiescence to the extension of his travels beyond Russian territory was withheld because of the inability of the Russian authorities to answer for the security of the lives of travellers beyond the limits of the Emperor's dominions.

Nothing but the strongest determination, the most indomitable perseverance, could have taken Captain Burnaby to his journey's end; and how that journey was performed is best told in the author's own words.

From St. Petersburg Captain Burnaby took the rail to Moscow, and thence by Penza and Riajsk to Syzran, the limit of the rail in that direction. From this latter point his real travels commenced, and as far as Kazala, on the Jaxartes, he had experience in Russian and Kirghiz posting with horses and camels, after which he traversed the Kizil-Kum on horseback.

It would appear that he passed on through Russia when the winter season was setting in, when the rivers were frozen, although the ice was not quite strong enough to bear, consequently he was at times obliged to leap over streams with the aid of a pole, and suffer the terrors of Russian snow-drifts and hard frost, at one time being so severely numbed that but for the kind efforts of a Cossack to restore circulation to his limbs, he might have returned home an armless cripple.

In a most vivacious and in a gossipy manner the author leads and conducts his readers through a series of most interesting scenes, writing in the simplest language, and dilating on the characteristics, habits, and customs of the natives of the countries through which he passed in a way which brings them home to us very nearly, and which impresses us with the idea that he either knew them before, or that he has a very keen instinct and a very remarkable intelligence.

The scraps of conversation and the incidents evidencing the tone of political opinion in Russia, the *bonhomie* yet the wilfulness of the Russian, the ignorance of Russian administrators, the excellent qualities of the unsophisticated poor, and illustrating the contrasting peculiarities and quaintnesses of the Kirghiz and the Khivan, are happy to a degree. At the same time, the reader will not be able to resist a loud guffaw over many passages, as when, for instance, he comes to the description of the shaving process to which Captain Fred Burnaby voluntarily and of set purpose resigned himself, in the presence of a large and laughing audience in Khiva: the native barber took him by the nose, and put his thumb into the Captain's mouth.

On his way to Khiva, Captain Burnaby was necessarily obliged to avoid the Russian fort on the Oxus, and so slipped into the khanat without the knowledge of the Russian military authorities. But he was soon found out, and, under excellent pretences, was summoned by General Ivanof to Petro-Alexandrofsk. In the meanwhile, however, Captain Burnaby had time to interview the Khan of Khiva, and had had very interesting conversations with him and his ministers. The following amusing conversation took place between Captain Burnaby and a Russian military officer at Orsk:—

> "'He looked at my pass—'So you have come from Khiva?'
> "'Yes.'
> "'You are English?'
> "'Yes.'
> "Here the man looked at me very fixedly, and continued: "'Will England cede us Kashgar?'
> "This question rather amused me, and I replied, pointing to a horse that was being led by the station, 'Will you cede that horse to me?'
> "'He is not my property,' said the man, looking a little astonished at the question.

---

* *Travels and Adventures in Central Asia*, by Fred Burnaby, Captain Royal Horse Guards. With Maps. Third Edition. (Cassell, Petter and Galpin, 1876.)

"'Well, Kashgar is not an English possession, and how can we cede to Russia what does not belong to ourselves.'

"'Then England will not fight with us about Kashgar?' inquired the inspector.

"'I really don't know, but I wish she would,' I replied, becoming a little annoyed by this evident attempt at cross-examination. 'Anyhow,' I continued, 'if you put your noses into Afghanistan, you will very likely get them pulled for you.'

"'Afghan!' said the man; 'oh, very good.' And taking a piece of paper he wrote down,—'If Russia should take the fortress Afghan (Krepost Afghan), there will then be war between England and Russia."

"'I have noted your words down,' he said.

"'So I see,' was my remark; 'but Afghan is not a fortress.'

"'That does not signify,' said the inspector; 'it is something, and you have said that if we take it there will very likely be war.'"

Captain Burnaby's *Ride to Khiva* is in every respect a charming book, and the value of it is not a little enhanced by the excellent maps attached to the volume.

——:o:——

THE SAILOR'S HORN BOOK OF THE LAW OF STORMS, by *Henry Piddington*, President of the Marine Courts, Calcutta. Sixth Edition. (Williams and Norgate, 1876.)

CAPTAIN HENRY PIDDINGTON, of Calcutta, was an industrious contributor to the study of the law of storms. His attention was first turned to the subject by the reviews of Colonel Reid's work, at a time when he had retired from a seafaring life, and held several posts at Calcutta, including the Presidency of the Marine Courts and the Sub-Secretaryship to the Asiatic Society. The law of storms was to him a subject connected with many associations of his early life, and more especially with one instance in which to the veering of a hurricane alone he owed his safety from shipwreck. His first memoirs on cyclones were published in 1839. In the following year he received extracts from numerous logs preserved at the India House, furnishing records of hurricanes from 1780 to 1840; and he thus accumulated proofs that these great storms are circular, that they turn from right to left, north of the Equator, and that they are progressive. He also made out the tracks on which they move, and their rates. Captain Piddington continued to publish accounts of all the important cyclones that occurred in the Eastern Seas from 1839 to 1851. This involved immense labour and research, the untiring and persevering collection of materials, and no small ability and judgment in their arrangement. Each memoir was accompanied by a chart showing the course of the storms. Altogether Captain Piddington published twenty-four memoirs on cyclones in the Journal of the Asiatic Society of Bengal

His chief work, however, was the *Sailor's Horn Book of the Law of Storms*, which was published in Calcutta, the second edition appearing in 1845. We heartily welcome the appearance of a sixth edition of Piddington's Horn Book, which has just been brought out by Messrs. Williams and Norgate. In a small compass will here be found a history of the science, an explanation of the various theories regarding cyclones, the tracks of cyclones in various parts of the world, accounts of storm waves and inundations, and the application of what has been ascertained on the whole subject. It is a thoroughly practical book, and no seaman's library should be without it.

——:o:——

ETRUSCAN BOLOGNA: A Study. By *Richard F. Burton*. London (Smith, Elder & Co.), 1876.

CAPTAIN BURTON'S versatility of taste strikes us forcibly on turning to the present work. We had barely finished following the fortunes of Hans Stade in Brazil, under the guidance of the gallant captain, when, hey! presto! we are hurried off by him to the Angola Coast; his next care is to instruct us in the technical mysteries of swordsmanship, and from this subject he now darts off to present us with a study of Bologna, in the days of that old and little-known race, the Etruscans.

Bologna, originally Felsina, appears to be the centre of a whole circle with a radius of 22 kilometers, which teems with Etruscan antiquities. Many of these are preserved in the two public museums of the city, and several private collections, and are described with minuteness by Captain Burton. The most remarkable "find," however, was the excavation of the Certosa in 1870-1, which resulted in the discovery of the burying-place of the western *regio* or district of Felsina. The objects found here, Captain Burton remarks, illustrate admirably the home life, the warfare, the religion, the luxury of northern Etruria, in the days of her highest development. After introducing the subject of the Etruscan man from an ethnological point of view, Captain Burton presents us with an able, though at times, to our thinking, a little too dogmatic a sketch of the geological history of early Italy. We are then furnished with a brief account of the four "waves" of invasion from the East, which resulted in the irruption of the Turis'a or Tusci or Etruscans in the fourteenth century B.C., a nation which is supposed to have occupied, as a great military power, the central peninsula with 300 *oppida*, and to have flourished for a period of between nine hundred and a thousand years. Captain Burton remarks that while the cosmogony of the Etruscans is Asiatic, the vast scheme of their religion, numbering upwards of two hundred gods and supernaturals, connects them with Persia, India and even Greece.

It would be beyond our power in a brief notice like the present to follow the author in his learned disquisitions on the language and craniology of the Etruscans. Captain Burton has treated every branch of his subject exhaustively, as is his wont, and though his work may appear from the title to be limited in its scope, it really performs the same office for North-Eastern Etruria that Dennis's great work and Mrs. Hamilton Gray's earlier volume did for the Middle and Southern portions of the Confederation. The last-named work should not be forgotten by the reader, for though we have not observed any reference of Captain Burton's to it, it is to its authoress that we are indebted for having first brought the fascinating subject of Etruria before the notice of the English public.

——:o:——

DIE CHINESISCHE AUSWANDERUNG. Von *Dr. F. Ratzel*. Breslau, 1876. (London, Trübner.)

IN a handy volume of 275 pages, Dr. F. Ratzel, of the Polytechnical School at Munich, not only traces the history of Chinese emigration, but also the position of the Chinese emigrants in the countries which they have selected for settlement. He first of all describes China, its people and institutions, discussing more particularly the causes which lead to voluntary as well as to compulsory education. He then takes us to each of the Chinese colonies, beginning with Mongolia, which is being steadily invaded from the south by industrious husbandmen, who are converting its unproductive wilds into fertile corn-fields. The author discusses the various questions connected with Chinese emigration fairly, without bias, and at the hand of the most trustworthy authorities. His book is brimful with facts, which have been marshalled with great skill. The subject is one of the most interesting, the author has done justice to it, and a translation of his valuable volume would no doubt prove acceptable to numerous English readers.

Log Book.

—:o:—

Results of the Voyage of the 'Polaris.'—Dr. Emil Bessels has completed the first volume of the work on the scientific results of the voyage of the steamer 'Polaris,' which is being prepared at the expense of the United States Government, under the immediate superintendence of Professor Joseph Henry, President of the National Academy of Sciences. The first volume contains the sections on hydrography, temperature of the air, hygrometrical observations, atmospheric pressure, winds, solar radiation, terrestrial radiation, face of the sky and state of weather, observations on ozone, meteorological observations taken at sea, chronometer journal, astronomical observations, pendulum experiments, magnetic observations and list of auroras, and psychrometrical tables. The tidal observations, including diurnal inequality, and investigation of the form and progress of the tidal wave, are especially important. The volume is illustrated by numerous diagrams and tables.

New Map of Bolivia.—Mr. J. B. Minchin, C.E., assisted by Commander Musters, R.N., have completed a new map of the Bolivian Republic, based on accurate astronomical observations. Mr. Minchin arrived in the country at the close of 1873, and his attention was early called to the generally defective state of the existing maps of the country. In the construction of the new map he has adopted a scale of 15 inches to the degree, as being the smallest on which the *quebradas*, or ravines, and hill-ranges could be conveniently shown. The longitude of Sucre, the capital of the Republic, was fixed by Mr. Minchin and Captain Musters, by means of lunar distances, eclipses of Jupiter's satellites, and lunar occultations: the mean of the results making it 65° 17′ west of Greenwich. This is taken as the first meridian on the map. The instruments used for the rest of the work were a sextant and artificial horizon, and a 6-inch Troughton and Simms' theodolite. Most of the principal places have been astronomically fixed by meridian altitudes of the sun and stars; and the longitudes by chronometer time-sights from Sucre, checked by prismatic compass-bearings of conspicuous peaks. La Paz, like Sucre, had its longitude fixed independently by eclipse reappearances of No. 1 satellite, and lunar occultations, observed with a 3-inch Troughton and Simms' telescope. The heights above the sea were ascertained by Casella's boiling-point thermometers, tested at Kew. Magnetic variation was observed for at La Paz (9° 45′ E.) and Sucre (9° 35′ E). It is to be hoped that some arrangement may be made for the publication of this valuable map of a little-known part of South America, in order that geographers may reap advantage from the admirable work of Mr. Minchin and Commander Musters.

Cyclone and Storm-wave in Bengal.—This appalling catastrophe which overtook the districts of Backergunje and Noacolly, in Lower Bengal, on the morning of the 1st of November last, has resulted in a loss of human life estimated at 215,000 souls, in an area of some 3000 square miles, inhabited by about 1,062,000 persons. There was a severe cyclone in the Bay of Bengal on the night of the 31st of October, but it was not the wind which proved so destructive (though that was bad enough) as the storm-wave, which swept along to a height from 10 to 20 feet, and inundated the districts. Whence this inundation came is at present the subject of meteorological inquiry at the hands of the Meteorological Reporter to the Government of India. The suddenness of the onset of the wave was such that the people had no time to clamber up to the roofs of their homesteads, but were lifted up to the surface of the water, together with the beams and thatches of their cottages. Each hamlet, consisting of four to six houses, is surrounded by a belt of trees, and these with their long, stretching arms, in many instances proved the salvation of large numbers of villagers. A peculiar feature of this physical commotion is that, while the water felt warm, the air, on the other hand, was bitterly cold. A part of the abundant rice-crop will be saved, and most of the trees, fruit-bearers or others, will recover; the wealth lost (except in the case of Dowlutkhan, a rich trading town, clean destroyed) being almost entirely agricultural, crops or cattle. The most efficient measures have been taken by the Lieutenant-Governor, Sir Richard Temple (from whose Minute the foregoing particulars are borrowed), to alleviate the distress, to prevent the outbreak of sickness or pestilence, and to re-establish social and commercial intercourse. As he feelingly expresses it, "Our object is to let the poor people see that the authorities are thinking, caring, feeling for them in their misery. This knowledge will brace their nerves, raise their spirits, and induce them to return promptly to all their accustomed industries." No appreciable loss of revenue is anticipated, and the expenses of relief will probably be met from the provincial funds without recourse to the Government of India.

Portuguese Colonies.—An interesting summary of information respecting the colonies owned by Portugal in different parts of the world, will be found in the October *Bulletin of the Paris Geographical Society*. They consist of the Cape de Verde Islands, the possessions on the coast of Guinea, St. Thomas and Princes Islands, Angola, Mozambique, Goa, Damaun, Diu, Mahe, Macao, Timor and Pulo-Bambing. Angola is the most populated and the richest of all, having made great strides of late years. It is divided into three regions—the coast district, which is sterile; the rising ground, which is extremely fertile; and the table-land, which is like Southern Europe in respect of climate. The population of the province in 1869 amounted to 433,307, and the value of its exports for the twelve months ended June 1874, was a little under £600,000.

A German African Society.—A German African Committee, in connection with the Brussels International African Association, has recently been formed at Berlin, Prince Reuss being elected President, and Herr von Beusen, Secretary. At its first meeting, which was attended by many influential persons, it was resolved that the Committee should assume the title of "The German African Society." A resolution was also passed to ask the Crown Prince of Germany to become Patron of the Society.

Correspondence.

THE COMANS OR KIPCHAKS.

To the Editor of the "Geographical Magazine."

Dear Sir,—Some years ago I wrote a paper on the Comans, which was published in the *Journal of the Ethnological Society*, in which the evidence was collected upon which it is almost universally accepted that the Comans were Turks—a view so well settled and so conclusively demonstrated long ago by Klaproth and by others since, down to the author of a paper in a recent number of the *Journal of the German Oriental Society*, that it would be mere waste of time to adduce the evidence upon which the conclusion is based, and I shall postulate it as an accepted fact.

The Comans were known to the Russians as Poloutsi, a name of which I do not know the exact etymology. The current one that it means *merely* the steppe or lowland men, the first particle of the name being connected with the Po in Poland, &c., not being deemed satisfactory by Russian students, and I should like to have some information on the subject.

Von Hammer says the name is compounded of pole, plane, or steppe, and Outsi or Uzi, a well-known Turkish name in the Byzantine writers (*Golden Horde* 18), but this I much question: the Uzes and Poloutsi, as I shall show presently, were not the same people.

To the Germans the Poloutsi were known as Valans; thus Rubruquis says: "To the Germans they are known as Valain, and the country as Valania (*Rubruquis d'Avezac*, 246). While in a letter of some friars, describing the Mongol invasion of Hungary, dated July 1241, and given by Matthew Paris, we read: "Kumani, whom we Germans call Valven" (*Wolff Geschichte der Mongolen*, 254). They were called Falones by Otto of Freisingen, Valui by Henry the Lett, Value by Arnold of Lubeck, Valewen and Valwen in the Chronicle of Luneburgh (*Zeuss*, 744 and 745). Zeuss says that the name Falawa is word for word Poloutsi, which he treats as meaning steppe-men (*id.* 744); other writers have compared the name to the Phali in Westphali and Ostphali, but of which no satisfactory explanation has been offered. Latham says, probably justly, that it is connected with Volhynia, the district from which the Comans may well have made their first acquaintance with the Germans, and it may be the name means merely the people of Volhynia. However this may be, it seems clear that the name Falawa, like Poloutsi, gives us little information about the original habitat or origin of the race.

Let us next turn to the name Coman. This name is almost universally derived from the River Kuma, which flows through the steppes north of the Caucasus, the country about which was known to the Persians as Kumestan, and which the Nubian geographer, Edrisi, calls Al Comania, adding that it gave their name to the Comanians (*Klaproth's Travels in the Caucasus*, 155). On the other side of the watershed, and in the same wide steppe, we have the River Kuban, which is called Kuman by the Nogays, who, like other Turks, do not always discriminate between *m* and *b*. Lastly, in the south-eastern corner of the Caucasus there is a town called Kuba, which may similarly be another form of Kuma. We thus find the name Kuma or Kuman occurring more than once in this area; and it is a very old name, for Pliny mentions a fortress of Cumania, situated on a rock near the Caucasian gates.

Not only their name, but also all their traditions, justify us in deducing the Comans from that pocket of land enclosed on the south by the Caucasus, and on the east and west by the Caspian and Black Seas respectively; but the name Coman is a geographical name merely, and does not enable us to trace the origin of the tribe very far. For this we must turn elsewhere.

Rubruquis tells us that those whom he calls Comans bore the indigenous name of Capchat, that is the well-known Turk tribal name of Kipchak. In this he is supported by Rashid ud din, Ibn al Athir, and the other historians of the Mongols, who call those tribes Kipchak which are named Coman in the contemporary narratives of western writers. And it was from them, when so called, that the Khanate of the Golden Horde was known as the Khanate of Kipchak; while the steppe north of the Kuma, which coincides more immediately with the Kumestan of Edrisi, was known until recently, and perhaps is still known, as Desht Kipchak. In this name we are on the trace of more fruitful matter. The name Kipchak occurs elsewhere, and still survives as that of a conspicuous section of the Turkish stock. Thus a main division of the Uzbegs is called Kipchak. One of the four chief divisions of the Middle Horde of the Kirghiz Kazaks is also called Kipchak.

The modern Kipchaks, therefore, form a section of that very pure Turkish race which is generally known as the Kirghiz Kazaks, but which is more properly called simply Kazak, which again, as I have argued in your pages previously, I believe to represent very purely and very markedly the Ghozz Turks of the Arab writers.

I believe that the Comans or Kipchaks of the Kuma belonged to the same Turk stock; and the question arises when and how did they reach the steppes of south-eastern Russia? The Russian chronicler Nestor speaks of them for the first time in the year 1055; while Scylitzes, who is the first of the Byzantines to name them, does not do so till 1078. Von Hammer, who names them in 995, is clearly mistaken, and has really ante-dated the particular invasion he mentions by a century; and we may take it as settled that there is no evidence of their presence in the Russian steppes before the middle of the eleventh century.

The Comans or Kipchaks, therefore, so far as we have any evidence, first occupied the Caspian steppes about the year 1055. Whence did they come? There are only two available directions, either from the south across the Caucasus, or from the north across the Volga. The latter is the generally received opinion, but I believe it to be faulty, and I believe that they came from the south.

M. Brosset, in a note on the Armenian village of Acorhi and the Convent of St. James, published in the *Bulletin of the Russian Academy*, viii., 43, tells us that a certain *Khiphtchakh* Khupasar is mentioned in the history of the Orpelians as having assisted George the King of Georgia against Ivan the Orpelian, and that King David the Restorer had 40,000 Kipchaks in his service, who assisted him in his various campaigns; and, he adds, there were therefore, in Georgia and Armenia, a certain number of people of this race who had settled there as early as the commencement of the twelfth century. When Subutai and Chepe, the two Mongol commanders, forced the passes of the Caucasus, we read of the Kipchaks being in close alliance with and forming a part of a confederacy consisting of Alans and Yasses or Ossetes.

It would seem, therefore, that there was a considerable element of a Kipchak origin in the Caucasus and the countries to the south. Let us get a little closer. Armenia was first invaded in force by the Turks in the year 1048 and 1049. We are told by Ibn al Athir that a considerable body of Ghozz of Transoxiana went to Ibrahim Inal (one of the generals of Thogril Beg, the Seljuk Khan of Persia) who said to them: "My country is not large enough for you to dwell in and to supply you with food; it is necessary to undertake an expedition against the Romans; you will fight in the name of God, and will gain much booty. I will march after you and support you in your enterprise." "The Ghozz accordingly set out and Ibrahim presently followed them. They advanced as far as Melazherd, Erzerum, and Kalikala, whence they penetrated to Trebizond. . . . .

Another body of the Ghozz had previously entered the Roman country, but their chief had returned to Thogril without doing much" (*St. Martin's Mémoires sur l'Arménie*, ii., 215 and 216). These Ghozz are the Oghuz Turks of other writers, and from this date they would seem to have settled down firmly on the borders of Armenia.

On turning to the Armenian account, as given by Stephen Orpelian, we find it stated that in 1049 the Ismælites, descendants of Hagar, attacked the Christians, and overran Khorasan, Khuarezm, Khuzestan, Fars, Kerman, Bokhara, Mazanderan, Irak, Baghdad, Basrak, Harran, and Azerbaidjan, and they assembled a great number of Persians, Khazaks, Kharazmians, Arabs, and Scyths of Turkistan, and encamped in great numbers on the plain of Erzerum, intending to destroy the name of Christian among the Armenians, Greeks, and Georgians (*id.*, 67). I have small doubt that the Khazaks of this account—which, by the way, is, according to St. Martin, the first in which the name Kazak occurs—were Kipchaks. Shortly after this, says St. Martin, they (*i.e.*, the Kazaks) settled in Georgia with other Turkish tribes. This was in the reign of George II., who occupied the throne from 1072 to 1089. Their descendants, we are told, still live there, speak a Turkish dialect and profess the Muhammadan religion. They have given its name to a district of southern Georgia, situated on the right bank of the Kur, between the Rivers Ktsia and Nidja, where they live mixed with Armenians. The district of Kazakhi contains twenty-nine little towns or villages (*St. Martin, op. cit.*, ii., 219).

I have already said that I deem Kazak and Kipchak to be to some extent synonymous, and I believe, therefore, that it is exceedingly probable that the Kipchaks or Comans, who appear for the first time in the Russian annals in 1055, were, in fact, the same people who made an invasion of Armenia in 1049. This clears up much difficulty in tracing the various threads of Turkish migration, which is much confused when we bring the Kipchaks from the country immediately beyond the Volga, then inhabited by the Kankalis, who, I consider, were a different section of the Turk race altogether. This identification is supported by the very remarkable fact that the long Coman vocabulary, which was analysed by Klaproth, is more like the Osmanli form of the Turkish than any other dialect, while we know that the Osmanli claim descent from the Ghozz Turks.

The Comans were terribly dispersed by the invading Mongols; a portion of them, however, remained behind in their old country, and are still known as Kumuks, and they form an important tribe, living somewhat to the south of the River Kuma. Another fragment is still to be found among the Nogays, one of whose small tribes pasturing still on the Upper Kuma is called Kipchak (*Klaproth's Caucasus*, 155 and 159).

Another section fled to Hungary where they were settled in two districts known as Great and Little Kumay. There is still one curious question which still remains to be mentioned, and that is, when Klaproth was given a list of Coman names to report upon when he went to the Caucasus, he found that these names are still found used there, and mainly among the Circassians.

It would seem from this that the Turkish Comans became the dominant chiefs of the whole northern borderland of the Caucasus; and this accounts for the traditions among the Circassians which point to a different origin for their princes and people, or it may be that, both in the case of the Comans and Circassians, the chiefs are descended from the ancient Khazars.

Before the year 1050, I hold, there were no Comans in south-eastern Russia, and we thus get rid of a second element in the confused population of that area. In the next letter I propose to speak of the Pechenegs. In regard to the alternative names of Berendeens and Bereditches or Berenditches, given by the Russians to the tribe mentioned in the previous letter, I may add a curious passage from the Georgian historian Wakhtang, as abstracted by St. Martin in the work already named. He tells us Thogarmos had eight sons, one of whom was called Bardos; and Bardos, on the distribution of his father's lands, received the country to the south of the River Mtkvari, from the outflow of the *Berdudji* as far as the confluence of the Mtkvari and the Rakhsi (Araxes). This Bardos founded a town there called Bardair (Bardaa), in which he lived.

St. Martin adds, that the Berdudji is the same river as the Debete or Boitkhalo in the centre of Georgia (*op. cit.*, ii., 183). It seems to me that the river probably gave its name to the Berenditches, who were also styled Berendeens from the adjacent town of Berdaa or Bardaa, as Von Hammer suggests.

Yours, &c.,

Henry H. Howorth.

Derby House, Eccles.

———:o:———

THE EARTH'S ROTATION.

To the Editor of the "Geographical Magazine."

Sir,—The involuntary journey which a man living at the Equator accomplishes daily, by being carried round on the surface with the earth's rotation on its axis every twenty-four hours, will be through a distance of about 25,000 miles, or 500 yards per second.

While the involuntary journey accomplished daily by the Arctic ship 'Alert,' in its late winter-quarters at N. lat. 83° 20′, would have been barely through 2,500 miles, or 50 yards per second, or about a tenth of the equatorial diurnal distance. The difference in friction alone will probably account for the lowered temperature at N. lat. 83° 20′; but many disturbing causes, such as circulation of water and air of different temperatures, &c., would complicate the calculation.

We may suppose that at the Pole the absence of friction (which would probably accompany the reduction to nil for the distance of the involuntary journey) would cause a cold quite insupportable to every living organisation for some distance (say 400 miles) around the actual Pole.

The subject is probably well known to mathematicians; but if explained in a popular manner, I think it would be very interesting to many readers at the present time.

Your constant reader,

J. Alfred Novello.

Villa Novello,
Via San Giacomo, Genova.

Livingstonia.—In our *résumé* of the address of the President of the Royal Geographical Society (see p. 338 of our December number), reference was made to the labours of the Established and United Presbyterian branches of the Scottish Church in Central Africa. As this seems open to misapprehension, we beg to call attention to the following, received from Mr. James Stevenson. "The recent initiation of missions in the interior was the work of the Scottish Free Church, which fourteen years ago surveyed the ground, last year founded the settlement of Livingstonia, entirely paid for and under the supervision of Mr. Young, R.N., who is still in her service, launched the steamer on the lake, and maintains it there. What has created misconception is the circumstance that the Free Church allowed a member of the Established Church to go with their party eighteen months ago to look for a site for an Established Church Mission quite apart from Livingstonia, and the liberality of the United Presbyterian Church, which sent and paid the salary of an able medical missionary till the education of the ordained medical man designated by the Free Church should be completed. I may properly add that all the Scottish Missions in Southern Africa, with the single exception of a mission of the United Presbyterian Church, whose principal work is Western Africa, belong to the Free Church."

Proceedings of Geographical Societies.

—:o:—

ROYAL GEOGRAPHICAL SOCIETY.

Meeting of November 27th, 1876.

CENTRAL AFRICA.

THE PRESIDENT, SIR RUTHERFORD ALCOCK, took the chair at 8.30 P.M.

A series of papers relating to Central Africa, and all referring to the results of the Expedition of the Khedive, under the direction of Colonel Gordon, to the region of the Nile Lakes, were read. The first, by Col. GORDON, related to

"OBSERVATIONS ON THE NILE BETWEEN DUFFLI AND MAGUNGO."

At the distance of about 20 miles to the south of Duffli the river begins to widen out, and the current becomes therefore less rapid; and from that point to Magungo the river is nothing more than a portion of Lake Albert. The current is very slow, not more than half a mile an hour; the bed is wide, sometimes as much as two or three marine miles, and it is filled with islands of papyrus. The banks of the river are fringed with papyrus, and are difficult of approach. The country is very populous—much more so than any other portion of Africa that Col. Gordon had seen—and the natives are well disposed. They were greatly astonished at the sight of the steamboat. The banana cultivation is met with at a distance of 40 miles to the south of Duffli, and it continues on south for 20 miles, when it ceases, and is not met with again until the Lake is neared, when it reappears. He did not know the cause of the interruption in the banana cultivation. At the distance of 50 miles to the south of Duffli the natives wear each a skin, farther on they clothe themselves with the bark of a tree. Col. Gordon believed that, taking Ratatchambé as a centre, and describing a circle with a radius reaching to Fashoda, that circle would include all the tribes that go entirely naked—a zone outside of that circle would include those half clad—and a zone outside that would contain the tribes who fully clothe themselves. He had not seen the branch which leaves the Nile and flows to the north-west, according to Mr. Gessi; having troops with him he could not delay his voyage to make close examinations of the country, but he had no doubt of its existence. He had found Sir Samuel Baker's map quite correct for the northern portion of the lake. The mouth of the Victoria Nile is very difficult to find, the whole coast being sown with papyrus islands; there are thousands of them, and one can hardly say where the lake ends and where the river begins. There is no current, and the water is shallow. One can hardly conceive the number of villages (Zeribahs) which exist on the left bank of the river. In this it resembles the Shillook country in former days. The lake has a sad and deserted appearance, and the country around is very uninteresting. The steamboat ran very well, and from what he had seen was sufficient for the service.

The second paper read, also by Colonel GORDON, was

"NOTES ON THE VICTORIA NILE BETWEEN MAGUNGO AND FOWEIRA."

From Magungo to Murchison Falls the river is navigable, and the current does not exceed one knot an hour; but from that point to the Karuma Rapids, 9 miles below Foweira, the river is full of strong rapids. The country is almost deserted by man. The banks of the river are bordered by trees. In a word, it is a wilderness. It seems that the Nile runs through a plateau from Foweira to Murchison Falls. Then, in a space of 10 or 15 miles, it has a fall of 700 feet. The rapids near Foweira are strong, but between them the river flows tranquilly. It is within the 10 or 15 miles space above alluded to that the waters fall most. Nothing can describe the solitude of this deserted country. The wars between Kaba-Rega and Aufina have prevented the natives from settling in the territory thus subjected to invasions from both directions.

The third paper gave a summary of geographical and scientific results accomplished by Expeditions made by the Government of the Khedive of Egypt, during the three years 1874, 1875 and 1876.

The next paper, communicated by the Rev. E. J. DAVIS, related to

"THE KHEDIVE'S EXPEDITION TO THE LAKE DISTRICTS."

The expedition under Colonel Gordon started from Cairo on the 23rd February, 1874, and reached Gondokoro on the 16th April, 1874. Finding that his government consisted of the three military stations, Gondokoro, Fatiko, and Foweira, that the troops were in want of many things, and in arrears of pay, he determined to return to Khartoum to obtain more troops, and to meet his stores. Having done so, he started with the same on 8th June, 1875, but owing to heavy rains and delays he did not arrive at Gondokoro till September, 1874. It was then seen that Gondokoro was unfitted for a station; it was therefore decided to evacuate it, and to establish two stations, Lardo and Rageef, one 12 miles below, and the other about the same distance above, Gondokoro. This evacuation was not completed till the 1st January, 1875, when Col. Gordon descended and made an inspection of the stations, Bohr and the Sobat, returning to Lardo on the 4th March. The remainder of the month of March was spent in the subjugation of Bedden and other hostile Sheikhs near Rageef; and now had to be faced the great difficulty, viz., how to establish a safe communication between the Lake Districts and Lardo.

Taking it roughly at 120 miles, the intervening country was one devoid of supplies, unless taken from the natives by force; in the rainy season the numerous streams were torrents, while in the dry season little water could be obtained. The natives were friendly or hostile, according to one's force, but may be generally said to be hostile. A reconnaissance having shown the Nile to be navigable considerably further south than was supposed, it was determined to establish the line of posts to preserve the communications between the north and south of the province, along the left bank of the Nile, and not to attempt the usual inland road. Keeping to the Nile prevented attacks being made on the stations from more than one side, and secured, at all seasons, a supply of water. The river was found navigable as far as Kerri; thence to the Asua it was possible to take up vessels, but difficult, however, from the Asua junction with the Nile. The river for ten miles was found quite impracticable; thus this ten miles is the only obstacle to a vessel of sixty to eighty tons, excepting, of course, the cataracts of the Nile in Nubia, ascending from the Mediterranean to the Lake Albert.

By the 1st January, 1876, the whole of the sections of the 50-feet steamer and two iron life-boats had arrived at Duffli, and their construction commenced, while troops were massed at Foweira for an advance south towards Victoria Lake. By the end of April 1876, the Lake Albert had been circumnavigated by Mr. Gessi, who found it much of the size it was supposed to be by Captain Speke, with no river of importance entering it. A branch from the Nile, soon after its exit from Lake Albert, flowing to north-west, was discovered; where it flows to is not yet known. The stations at Masindi, Mrooli, and Magungo were formed, and at the end of July the ten-horse-power steamer was completed, and made her first voyage from Duffli to Magungo, at the entrance of Victoria Nile. The Nile may now be considered to be known along its whole course, with the exception of the branches flowing north-west from the Nile after its exit from Lake Albert, and that flowing from Lake Masanga, half-way between Mrooli and Urondogani. The country generally is quiet and the roads secure. The inflow of ivory continues good; the expenses of the occupation are fully covered by the revenue, which may be put down roughly at £60,000 a year; and the future of the province will depend much on the amelioration of the route from Cairo to Khartoum, and on the enterprise of private merchants, who hitherto have been discouraged from venturing up on account of the insecurity of the routes, which, however, are now safe.

The following paper, by M. KORNOLO GESSI, was next read

"ON THE CIRCUMNAVIGATION OF LAKE ALBERT NYANZA."

With two iron boats, manned with eighteen sailors and twelve soldiers, Gessi left Duffli on the 7th of March, 1876, and arrived at the mouth of the lake on the 18th, their slow progress being attributable to the contrary winds, the incessant rains and the currents. His mission was to explore the part of the river between Duffli and the lake, to visit Magungo and to go round the lake. From Duffli to the lake is 164 miles, and throughout the whole distance the river is navigable, deep, and broad; in certain places exceeding 700 yards. At two-thirds the distance from Duffli there is a large branch which runs in a N.N.W. direction, and probably flows towards Makraka, in the country of the Niam Niam. The country is very rich; the natives are clothed in the skins of antelopes or goats; and the products of the soil are varied, consisting of millet, the wheat of the country, sesame, honey, tobacco, bananas, beans, &c. Cattle are abundant, and comfort and plenty appear to reign among the people.

They arrived at the entrance of the lake at the time of the equinox, and the stormy weather compelled them to wait till the 20th of March, when they again started to traverse the north-eastern corner in the direction of Magungo; but when about two-thirds across a strong land-breeze suddenly sprung up, and prevented them from reaching the coast. On the 30th they arrived at their destination, and the 12th of April found them again *en route*. Early in the morning they arrived near the first islets, which lie 5 to 7 miles distant from the shore. These were found to be full of natives, who had resorted here to escape the pursuit of the troops.

The mainland of the lake is low, the shores sandy, and the interior rich in vegetation and timber. Three cataracts were passed on the 13th, called Humo, Wahambia and Nanza. They proceed from a large river called Tisa, which is never dry. The natives declared that although they had been very far into the interior of Uganda for ivory, they had never reached the source of this river.

Continuing their course on the 15th, they experienced violent weather, which compelled them to secure their boats in a snug harbour, which Gessi named Port Schubra. It contained many villages, and is 250 yards wide, and 600 to 700 in length. On the 18th, after a course of some 40 miles, islands and vegetation were observed in the distance, and 10 miles further they entered a river, which they ascended for 7 miles when they were stopped by papyri and other aquatic vegetation. From the heights a large waterfall leaped down, much grander than the three they had already passed. The river came to an end in this *cul de sac*. A village was found close at hand, but the natives had already fled. After waiting several hours three slowly approached, from whom it was learnt that the waterfall came from waters which accumulate in the mountains and form a river during the season of the rains, but which dry up, together with the river, in the dry season. They also informed Gessi that he was then at the end of the lake, and that he could not get beyond the ambatch, for the water was only as deep as their knees; and they assured him there was no river at the end of the lake. This country is called Quando, and the inhabitants are suspected of cannibalism.

Clearing out of the river on the 19th, they endeavoured to force a passage through the ambatch, but without success. Keeping to the border of the ambatch fields, they crossed the lake from east to west, a distance of 40 miles, without finding any passage. Finding themselves on the opposite shores they endeavoured to obtain information at a village which lay before them, but the inhabitants fled, carrying off their property. The Nogaras called together their warriors, and made hostile demonstrations. Waiting until their military evolutions were finished, Gessi hoped that some one would approach, but they were very hostile, and he could not get near them with his boats. At the next village, the inhabitants also fled to the hills with their goods, but showed no hostility, and some of them came near enough for the interpreter to make himself heard. Requesting them to send their chief to speak with Gessi, an old man of about sixty years came and sat down on the beach; and in answer to questions put to him concerning the lake, Gessi found that his account perfectly agreed with what they had been told on the eastern side. Nothing further being practicable, preparations were made for the journey north. Not a single harbour or sheltering place was met with along the coast, and in consequence of the violent weather, they were driven 40 miles out of their course.

No currents were noticed during the voyage, except that with strong west winds the water drifted towards the north-east, and with north-east winds towards the south-west. A line on the face of the rocks, about 4 inches above the present water-level, was noticed; but whether it marks the limits of the highest water in the lake could not be ascertained, as the natives on all sides had assured Gessi that the waters neither rose nor fell.

After the reading of the papers by Mr. R. MAJOR, a discussion followed, in the course of which the President bore testimony to the great interest taken both by the Khedive and Colonel Gordon, not only in the cause of geography, but also to humanity, in opening up a communication from the Mediterranean to the Albert and the Victoria Nyanzas. He also expressed the deep regret with which the society had heard of the death of Mr. REBMANN, one of the East African missionaries, who originally called attention to the system of great lakes of Central Africa, and who was one of the discoverers of the snow-covered mountains Kilimandjaro and Kenia. At the time of his death, which occurred in Kornthal near Stuttgart, Mr. Rebmann was engaged in passing through the Press his Dictionary of the Kiniassa language.

Meeting of December 12th, 1876.

THE ARCTIC EXPEDITION.

This, the third meeting of the session, was held in St. James's Hall, which was filled to overflowing. Among those present were H.R.H. THE PRINCE OF WALES, the Duke of Sutherland, Lord Houghton, Sir Bartle Frere, Sir Henry Rawlinson, Sir Alexander Milne, Dr. Petermann, and the Officers of the Expedition.

The PRESIDENT (Sir Rutherford Alcock), in opening the proceedings, said:—Your Royal Highness, my lords, ladies and gentlemen, we are to be congratulated this evening that your Royal Highness has been pleased to associate yourself with the Geographical Society in rendering honour to those who, amidst many perils and singular trials, have done their best to reflect honour and credit on the service and the country which claimed them. We are met here this evening for a twofold object. The first is to give that welcome, that they have so richly earned, to the officers of the Arctic Expedition; and secondly, to hear from their own lips some account of their experiences and their strange trials and adventures in that unknown region, the North Polar

Sea. We have all, no doubt, read with great interest the published Official Report of Sir George Nares, the Commander of the Expedition, but that I consider to be a mere skeleton of what they have to tell us whenever the opportunity is afforded them; it is but the dry bones which they have to bring to life and to clothe with living words before we can thoroughly enter into the great and important service which they have rendered, and appreciate the noble spirit in which they performed their duty. We shall be favoured to-night with an account from three of the senior officers. Captain Sir George Nares will read a paper on the North Circumpolar Sea; Captain Stephenson will read another upon the winter experiences in the 'Discovery'; and Captain Markham will give us some account of the Arctic Sledge-Travelling. These papers will, no doubt, fill up the whole of our time; and the truth is that it is not the extent of geographical discovery nor the scientific results that most deeply touches the fibre of the popular mind at this moment. It is the high qualities that have been displayed by these representatives of our British Navy, and their powers of endurance, unflagging courage, and never-failing spirit of generous emulation, which have touched the best chords of our hearts, and these are the things which we come now to congratulate them on having so successfully displayed. There are many kinds of heroism, many degrees of courage. We are, perhaps, too much in the habit of associating the word "hero" or "heroism" with the battle-field, the storm, and the fight that takes place either between bodies of men on shore or ships at sea; but I think very few will have read through this bare narrative, unfilled up as it is of the hairbreadth escapes, of the constant perils, of the marvellous adventures that these ships and the sledge parties have incurred, without feeling that it is a great mistake to limit heroism to the mere carrying of a flag through storm and peril to victory. These Arctic ships had to be navigated among great ice-floes 20 or 30 feet thick; and as Sir George Nares has well described, if two of these ice-floes clip a ship between them it is crushed like a nut. They are like great blades of some superhuman shears. There is no human force that can possibly resist them. Fancy what it has been navigating through such seas for a month together, never certain from one hour to another whether it will be possible to avoid these great icebergs that are eddying around the ship. And then if you take some account of the sledge-journeys, nothing more marvellous has ever been related. I say nothing of the long night of 142 days, of the lowness of the temperature where 60° below zero has been reached, and where men had to live, and to work, and to plough through the snow, under this intense cold; but these sledge-journeys, I venture to say, have never been paralleled, take them altogether, either in what they achieved or in the dangers and perils they have confronted with the most perfect spirit, without once flagging, even though disease struck many of them down. One incident alone will tell you much. They had to pass a night on one range of hills where the cold was so cruel that they named the place "Frostbite Range." Fancy having to travel through a range of snow-clad mountains and icebergs that was characteristically named Frostbite Range! There was one heroic event among many which was marked in a very few lines by Captain Nares with the due meed of praise, though he was of course anxious not to single out one as deserving more than another, for there has been nothing more gratifying, nothing that reflects more honour and credit upon them and the country, than the generous emulation, the absence of all possible jealousy or rivalry except in the finest and the highest spirit. The sledge-party commanded by Captain Markham, after making one of the most extraordinary passages north over the frozen sea, and over great hummocks of ice through which they had to cut their way, making only 2 miles a day, but having to go over the same distance five times, were at last struck down with fatigue and disease; and when they were 30 miles from the ship, with five of their companions laid helpless on the sledges to be dragged, it was clear that there was no power in human sinew and courage to carry their sledges further. It became clear that no power of their own could carry them to the ship; it was therefore decided that one of the party should endeavour to reach the 'Alert' for assistance, which was accomplished after a lonely walk of 30 miles in 22 hours. You are, no doubt, all anxious to hear from the heroic travellers the whole account of their experiences. I merely venture to say these few words because I know that this assembled crowd is not here without feeling the deepest sympathy, and the most earnest desire to give them the hearty welcome that they have so nobly earned.

Captain Sir George Nares then read his paper on

"The North Circumpolar Sea."

On the part of the Arctic officers he had to thank them, and, in fact, the whole of England, for the welcome home that had been given to the Arctic Expedition. Time would not admit of his touching more than briefly on matters which he had not mentioned in his official report. He did not pretend to state new facts or to start new theories, but merely to place before them, in a simple form, what he had gathered from nature and from published works. Upwards of one hundred photographs were brought home by the Expedition, representing the exact characteristics of the Arctic Seas, and were now being printed. These might be accepted as nature's own report, which could not possibly be garbled or put on one side. In order to explain his subject more clearly, Captain Nares entered at some length on the action of oceanic currents in the distribution of heat, and on the drifts from the Polar basin southward during the summer season. Those drifts of ice in the Arctic Seas were found to progress about four miles a day. Into the Polar basin, which he considered a locked-up bag, was ever flowing a stream of warm water, pouring in between Spitzbergen and Norway, and another stream of cold water running out on the west, the former carrying a great amount of heat into the north, and the other carrying a great amount of cold to Canada, the west of Greenland, and North America. So great is the difference in climate caused by these two powerful distributors of heat and cold, that the temperature of the sea on the American coast, or the border of the cold current, 2,200 miles from the Equator, is the same as that midway between Spitzbergen and Norway in lat. 70° at nearly double the distance from the Equator. The inhabitants of New York, if they were to bathe in the sea, would actually have to plunge into water of the same temperature as that off the north point of the coast of Norway. Thus, as was to be expected, the lightest ice was found near the inflow of the warm stream; and the heaviest near the outlets. The same kind of ice had been traced all the way from Behring Straits eastward to Banks' Land, and further west to Prince Patrick's Island, and from that to Ireland's Eye, at which point it was lost. Pushing their way in the 'Alert' and 'Discovery,' towards the entrance of Robeson Channel, they gradually realised the accuracy of these facts. No very distinct knowledge could be obtained of the nature of the ice in the Polar Sea; whether it extended to the Pole or across the Pole he could not exactly say, but it was certain that a vast distance was covered with ice throughout the summer, and was not open. The masses were broken up in summer and swayed backward and forward; but there was no such thing as a navigable channel, and in September all became cemented together again. The new formations taking place seven months in the year would more than counterbalance the breaking up in the other five; and as the area of the polar basin could not be less than one million square miles, and its principal outlet between Greenland and Spitzbergen was not more than 300 miles wide, and only the western half was occupied, it was a matter of calculation as to the quantity of ice that could get out, and it was easy to see that some of that remaining must be at least 100 years old. All the driftwood that was found was found in bays open to the west, never in bays opening towards the east. After glancing briefly at the results of the Austrian Expedition, Captain Nares went on to say that from their observations and experience they might reason with confidence that if land existed at the Pole it would be vegetated, and birds would make their way over the 400 miles to be further out of the way of their natural enemies, but no flights of birds were seen. In consequence of the widely-spread belief that the Pole could be reached by other means than by sledging over the ice, he concluded with a few words on the subject:—"Arctic travelling must always be most severe work. I would therefore request our many friends who suggest plans for assisting us over the ice, to first mature their propositions in a more temperate region. Without in any way detracting from the suggestions, I may state that no one can realise what Arctic sledge-travelling really means until he has travelled across country, totally on his own resources—say from London to Edinburgh and back again. If the advocates for ballooning will start from the north of Scotland, carrying their own provisions, visit Iceland, 450 miles distant, and return exactly to their starting-point—for a mistake of 20 miles would be fatal—without receiving any outside aid, then only can we entertain the idea of using a balloon. Time permits me to only briefly allude to the present migration of the Eskimo from the south-east part of Greenland towards the Danish settlements near Cape Farewell, where from ten to twelve become incorporated yearly with the more civilised Eskimo, living happily and in comparative comfort under the well-ordered supervision of Danish officials. Knowing that glaciers cut off these people from travelling south along the west coast of Greenland, we may conclude that they have crossed from Grinnel Land to Polaris Bay, journeyed round the north end of Greenland, and passed to the southward along the eastern shore to richer hunting-grounds, as proved by the presence of numerous bears, which can scarcely exist in regions where Eskimo are unable to obtain sufficient food. Before concluding, I should like to say a few words regarding the Polaris Expedition, for that ship most undoubtedly must have met the same kind of ice that we did. They must be credited with having reached the limits of navigation on the east side of Robeson Channel, as we did on the western side, and Captain Buddington was perfectly correct when he stated they could go no farther. Had he not been overpowered by a majority, he would have informed us of the nature of the Polar ice some years ago. We all look upon Captain Buddington as a very hardly-used man; and had the travelling parties from the 'Polaris' been organised as Hall would doubtless have done, on the plan first originated by Sir E. Parry, they would have told our story to the world instead of our doing so now. However, it must be remembered that where we had 120 disciplined men, the 'Polaris' had only a crew of twenty-seven.

Captain STEVENSON of the 'Discovery,' next read his paper on

"ARCTIC WINTER EXPERIENCES,"

Arctic service, he remarked, had always been and would always be popular in the Royal Navy. It had been said that the service was the finest nursery for seamen in the world, though so far as actual seamanship went, the ships were frozen up for eleven months out of the twelve. But the service was admirably adapted for developing the courage and self-reliance of the men engaged in it. The 'Discovery' went into winter quarters on the 26th of April, in a well-sheltered inlet, in which the ship could be frozen in close to the shore and not be subjected to the moving pack. The 'Discovery' was very fortunate in finding a good fiord on the north side of Lady Franklin Sound, which made one of the finest harbours he had ever witnessed. The ship wintered in 12 fathoms of water, within 200 yards of the shore, and surrounded by a country mountainous in the extreme. Here they lay embedded in the ice for ten months and a half. The first thing to be done in preparing for wintering was to land stores and fuel sufficient for six months in case they were burnt out, which was their greatest danger. The pipes and pumps were next drained of water, and the ship well-lighted between decks in order to increase the comfort of the men by giving it a light and cheerful aspect. A layer of snow some ten to twelve inches thick was laid on the deck, but as it was found not to bind, it was mixed with ashes and water, and soon made an admirable macadamised road. As soon as sufficient snow could be found it was piled up outside the ship about fifteen or twenty feet thick. This, and the layer on deck, kept the warmth in the ship, and the temperature on the lower deck ranged from 48° to 56°. On the 16th of October they lost sight of the sun for 135 days. Up to the time that the sun had departed shooting had been carried on, and thirty-two musk oxen, thirty-six hares, six seals, and five eider duck had been bagged, so that when the darkness came on they had no less than 3,053 lbs. of frozen fresh meat in the ship; 800 lbs. a month being the amount usually consumed, the ration being 1½ lb. per man every three days. He could not say much for the delicacy of musk ox, as it was so very musk. Since he arrived in England he had been offered £50 for the head of one of these animals, and people on all sides appeared very much astonished that so few of the skins had been brought home. During that time Lieutenant Archer undertook the survey of the harbour, and some of the difficulties he had to encounter in the work would form a most amusing narrative. Captain Beaumont, too, had great difficulty in his meteorological observations, owing to the freezing of the mercury. Lieutenant Archer, however, took some astronomical observations, but the freezing of the mercury, the cracking of the quicksilver, and the impossibility of reading the observations, combined with other causes, were of such a nature as to call for an amount of zeal and ingenuity which could only be understood by those attempting it. He had been asked since his return if he had not found the darkness very long and tiresome. He considered it by far the most enjoyable time of the whole period spent in the Arctic regions. The ship was very warm and comfortable, and all were employed in the work most interesting to themselves. When the sledging season commenced, men and officers were broken up into parties and separated. The simple stories of these sledging crews would have to be read to be appreciated.

Captain MARKHAM then read his paper on

"SLEDGE TRAVELLING."

After a few prefatory remarks, Captain Markham observed that the sledges that were ordinarily used, and to which a decided preference was given, were what are commonly called eight-man sledges, and the weight carried on each was 1700 lbs., or at the rate of 220 to 240 lbs. per man. The tents were 17 feet in length, affording 14 inches in width for each man to sleep on, and about his own length. Every man was clothed in "duffle," and slept in "duffle" sleeping-bags. They had three meals a day. Breakfast, consisting of a pannikin of cocoa and a quantity of pemmican, was always taken in bed; luncheon consisted of warm tea, four ounces of bacon, and a little biscuit, but the weather was frequently so cold that they had much difficulty in getting the kettle to boil, and were obliged meanwhile to walk sharply about to avoid frostbite. After ten or twelve working hours supper was served, pipes lighted, and an allowance of spirits made to those who were not total abstainers. The mid-day tea was found very refreshing, and was infinitely preferred by the men to the half-allowance of grog that was usually served out to them. In September 1875, the ship having been established in winter-quarters, and a preliminary sledging party having returned to the 'Alert,' one on a more extended scale left the ship. The temperature on leaving was at zero, but fell during their absence as low as 25° below zero. A sudden fall one day was most disastrous, causing several severe frostbites, resulting in a few cases in amputation. These frostbites were due to their footgear being in a constant state of saturation, caused by the frequent immersions owing to the rotten state of the ice. So deep was the snow that they had several times to use their shovels to clear the road. In twenty days they marched a distance of 200 statute miles, and succeeded in planting the English flag a mile or two beyond Sir E. Parry's highest position. On the 3rd of April, 1876, seven sledges were drawn up in line, packed and provided for an extended absence, and a band of fifty-five officers and men ready and willing to drag them as long and as far as their strength would admit. It was a bright sight to see them before they set out, each of the seven sledges bearing colours worked by some fair hands at home. These seven sledges were to travel together as far as practicable, when the northern and western were to branch off, and the others to return to the ships. The northern division consisted of two officers and fifteen men, and their instructions were to proceed over the ice with the view or reaching as high a latitude as possible. The western division consisted of one officer and seven men; and a third party, belonging to the 'Discovery,' was to explore to the eastward, along a portion of the northern coast of Greenland, while other parties from both ships were engaged in other important investigations. On some occasions the cold was so great as to deprive the men of sleep. The coverlids of their beds were frozen, and when thawed by the heat of their bodies became literally wet blankets. The lowest temperature recorded inside the tent was as low as — 25°, and no temperature above zero was registered until the 28th of April, and it never rose to the freezing point until June. The operation of putting on their duffle-jumpers afforded them much merriment, so stiff and hard had they become from the intense cold. For the first three or four weeks their bacon was frozen so hard that they had to put it in their tea to melt, thus cooling the tea, and converting it into a decoction resembling soup. As a rule they were assailed by an intolerable thirst, which it was difficult to assuage for two reasons; first because they could not afford sufficient fuel to condense extra water, and secondly, it was quite impossible to prevent the water in the bottles from being converted into ice, in spite of the tin water-bottles being kept inside the waistband of their trousers.

Captain Markham then described the advance of the northern party. The ponderous nature of the ice, and the heavy weights they were compelled to drag, rendered progress very slow and tedious. Added to which the terrible malady that gradually but surely attacked and prostrated the men, augmented the difficulties that they were called upon to encounter. Large floes afforded the best travelling, but these were rarely met, and in place thereof they had small but heavy floes surrounded by broad belts of stupendous hummocks varying from 15 to 20 feet in height, and from 20 yards to a quarter and half a mile in breadth. Around these hummocks were deep snow-drifts, through which they frequently floundered up to their waists, the snow on the actual floes being as much as 2 to 3 feet deep. As they advanced in a northerly direction these floes got larger, and heavier hummocks were encountered, until at their extreme point they arrived at a perfect labyrinth of squeezed-up hummocks, through which with sledges it would be most difficult and tedious to make any progress. The total distance travelled by the northern party was 600 statute miles. The western division was eminently successful, and travelled 725 miles. After alluding to the work done by the eastern division, the return of which brought to a conclusion the sledging operations of the Expedition, Captain Markham concluded by paying a tribute of praise to those noble fellows who, overtaken by sickness, bore their suffering with manly fortitude and endurance, and with praiseworthy devotion to the object they all had in view.

His ROYAL HIGHNESS THE PRINCE OF WALES then rose and said:—Ladies and Gentlemen,—After the admirable address that we have heard on the part of the President, and the able and most interesting papers which have been read by Captain Sir George Nares, Captain Stephenson, and Captain Markham, it would be perfectly superfluous on an occasion like the present for me to make any remarks; but it affords me the highest pleasure and the highest satisfaction to be allowed to move a vote of thanks to these gallant officers for the interesting and pleasant evening they have afforded us, and also to ask you all, ladies and gentlemen, most enthusiastically and most cordially to give them that hearty and British welcome which they have so thoroughly deserved.

Sir HENRY RAWLINSON, in seconding the motion, said:—Your Royal Highness, Sir Rutherford Alcock, Ladies and Gentlemen,—As I had the good fortune to represent the Royal Geographical Society in those preliminary discussions two years ago which led to the despatch of the Arctic Expedition, I am naturally much pleased at being allowed on this occasion to second the vote of thanks which has been proposed to you by His Royal Highness the Prince of Wales, to be given to the officers of the Arctic Expedition by the Royal Geographical Society on their return from their perilous voyage. Ladies and gentlemen, ample justice has been done, but not more than was thoroughly deserved, to the public services of Sir George Nares and his companions, both by our excellent President in his eloquent opening address, and also by the remarks of His Royal Highness, whose solicitude is well known for the national interests and the national honour. He is never more at home than when he is bestowing well-merited praise on British officers who have done their duty. But, ladies and gentlemen, I venture to suggest that while full justice has been done to the public and professional services of Sir George Nares and his companions, sufficient attention, perhaps, has hardly been drawn to the scientific services of those officers, which, nevertheless, is what principally concerns this Geographical Society as a practical scientific body. It will be remembered that when the Geographical Society, in concert with the Royal Society and other leading scientific bodies, recommended the despatch of an Arctic Expedition, the scientific advantages of such a measure were especially dwelt upon. It was urged, and it was urged with truth, that the despatch of an Arctic exploring expedition to a high northern latitude was a necessary complement to the voyages of the 'Challenger,' and it was mainly in defence of this view that the Government acceded to the prayer, and summoned Sir George Nares from the command of the 'Challenger,' at one extremity of the globe, to the command of a sister expedition at the other. And what has been the result? Although the unreachable Pole has not been reached, still the expectations of Government and all the friends of the Society have, I venture to say, not been disappointed. Those who have listened this evening to Sir George Nares' ingenious argument, and have reflected upon the vast amount of observation, of thought, and of inquiry, which was necessary for the elaboration of those arguments, must feel inclined to place him in the first rank of Physical Geographers. The scientific materials, indeed, which he has accumulated in the command of these two expeditions, his multitudinous observations, and his extensive research, have not only added to his personal reputation, but have reasserted for England that leading place which she formerly occupied among the scientific maritime nations of the world. And, ladies and gentlemen, I will venture on one word further before I sit down. I would remind you that greatly as we must admire the public and professional services of Sir George Nares and his officers, greatly as we value those services, and we do greatly value them, still his scientific additions to our acquaintance with the laws and operations of Nature, in regions hitherto very little known, are the most lasting and most important portion of his labours; not ministering to the glory of a single profession or a single nation, but adding to the great sum of human knowledge, and thus contributing to the happiness and welfare of all mankind. In grateful admiration, then, of the public, the professional, and the scientific services of Sir George Nares and his companions, I venture to recommend most heartily to the approval of the Fellows the vote of thanks and congratulation which has been moved by His Royal Highness the Prince of Wales.

The vote of thanks was accordingly carried, with three hearty cheers for the crews of the Expedition.

———:o:———

BERLIN GEOGRAPHICAL SOCIETY.

November 4th, 1876.—Baron RICHTHOFEN in the chair. The President referred to the important results achieved by the English Arctic Expedition, and informed the meeting that several extra meetings would take place in the course of the present session, at which lectures would be given by celebrated travellers. Captain Schleinitz would lecture on the Cruise of the 'Gazelle,' Dr. Jagor on Further India, Dr. Brehm on Siberia, and Dr. Riess on his travels in South America.

Dr. NACHTIGAL delivered an obituary address on Dr. Otto Ule, of Halle, dwelling more especially upon the public spirit of the deceased and his amiability of character. They proposed to raise a subscription for the benefit of his uneducated children.

Dr. BASTIAN delivered a second lecture on his travels in America, and more especially in Colombia. He confined himself on this occasion to the ancient civilisation of this country, and the mythology of its aborigines.

Dr. NACHTIGAL read the following letter from Dr. J. Pogge, dated 3rd May, 1876, Mona Cadinga, on the Lulua:—

"I yesterday crossed the Lulua and arrived at Cadinga. On the 16th September last year I left Kibondo, and on the 9th December I reached Quinzemena, the 'Musumba,' *i.e.*, big camp, of the Muata Yamvo. On the 17th April I started upon the return journey. I am compelled to remain here until the beginning or the middle of June, to wait for the subsidence of the waters, for rivers and swamps are difficult to cross now, and I have already lost four out of my six riding oxen. I had no opportunity to forward a letter from Musumba. My carriers, who had only been engaged to proceed to Musumba, refused to return alone, stating that the journey was too long. My articles of barter are nearly exhausted, and I left Musumba on that account, so as to bring my carriers as far as this place on the Lulua, whence I am about to send thirty of them without burdens to Kibondo or Malange, who will take with them this letter.

"I stayed altogether a little more than three months at Musumba. I was unable to proceed further to the north or north-east, as, in spite of repeated attempts, the Matiamvo would not permit it. I was forced to content myself with going six days' journey to the south-east, accompanied by five carriers. On arriving at Injibaraka, a village three days' journey to the east of the Casserigi river, a messenger sent by my interpreter, Germano, overtook me, and begged me to return, as Matiamvo was full of suspicions, and had threatened to have me brought back by force should I not return voluntarily. I should not, however, have allowed this threat to interfere with my proposed visit to the Lubilash, to the north-east of Injibaraka, had rain and inundations proved smaller obstacles. The rivulets with steep banks were 5 or 6 feet deep, and oxen and carriers found it difficult to land, whilst portions of the Plain of Injibaraka were covered with 1 or 2 feet of water. We constantly run the risk of sinking into holes 5 or 6 feet deep, filled with water, and it rained incessantly.

"I then returned in a southern circuit to the Efuka ferry over to Calanye river, about a German mile to the east of Musumba, from which place I had been absent between the 28th January and 28th February. This small excursion has proved of great use to me, for it enabled me to ask questions on the geography of the country, from the chiefs, which I did not dare to ask at Musumba. For all I did there was reported to the Matiamvo, who is a very mistrustful and superstitious negro.

"My diary, I believe, will meet the requirements of the Society. I have laid much stress upon geographical information. I know the extent of Matiamvo's empire, and am well informed as regards the countries between the Guango and Kassai. Petermann's map of 1874 is very defective and full of errors.* I have laid my road by compass, estimating the distances by my watch, and hope to be able to continue this itinerary as far as Kibondo. I shall hand this book *verbo tenus*, to the Society. I have collected plants, butterflies, beetles, specimens of metals, sixteen negro skulls, woods, utensils, &c. All the skulls are more or less injured. They belong to the Cauanda (Cassanda ?) tribe, living four days north of Musumba, between the Luiza and Calangi, amongst whom the Matiamvo recruits his slaves. Molua skulls were by no means rare at Musumba, but it would have been a mistake had I laid myself open to reproach for the sake of a skull.

"I hope to reach Kibondo in the middle of August. I shall there remain a few days and then proceed four days' journey to the Chipaka, on the road to Cubango, where, my guide Ebo tells me, metal similar to that found by me *en route* (copper ?) is met with. By the end of September or the beginning of October, I may be at Malange. I propose to proceed as rapidly as possible to Loando, and return with the first steamer to Europe."

The remainder of the letter refers to pecuniary affairs. It appears that Dr. Pogge was presented by the Matiamvo and the Lucokasha (?) of Musumba with three or four hundred pounds of ivory, which he was "not able to decline nor willing to throw into a river," and which he proposes to sell in Angola.

---

* Which need not cause surprise, as the country explored by Dr. Pogge has, for the greater part, not been explored by European travellers.

NOTICE.

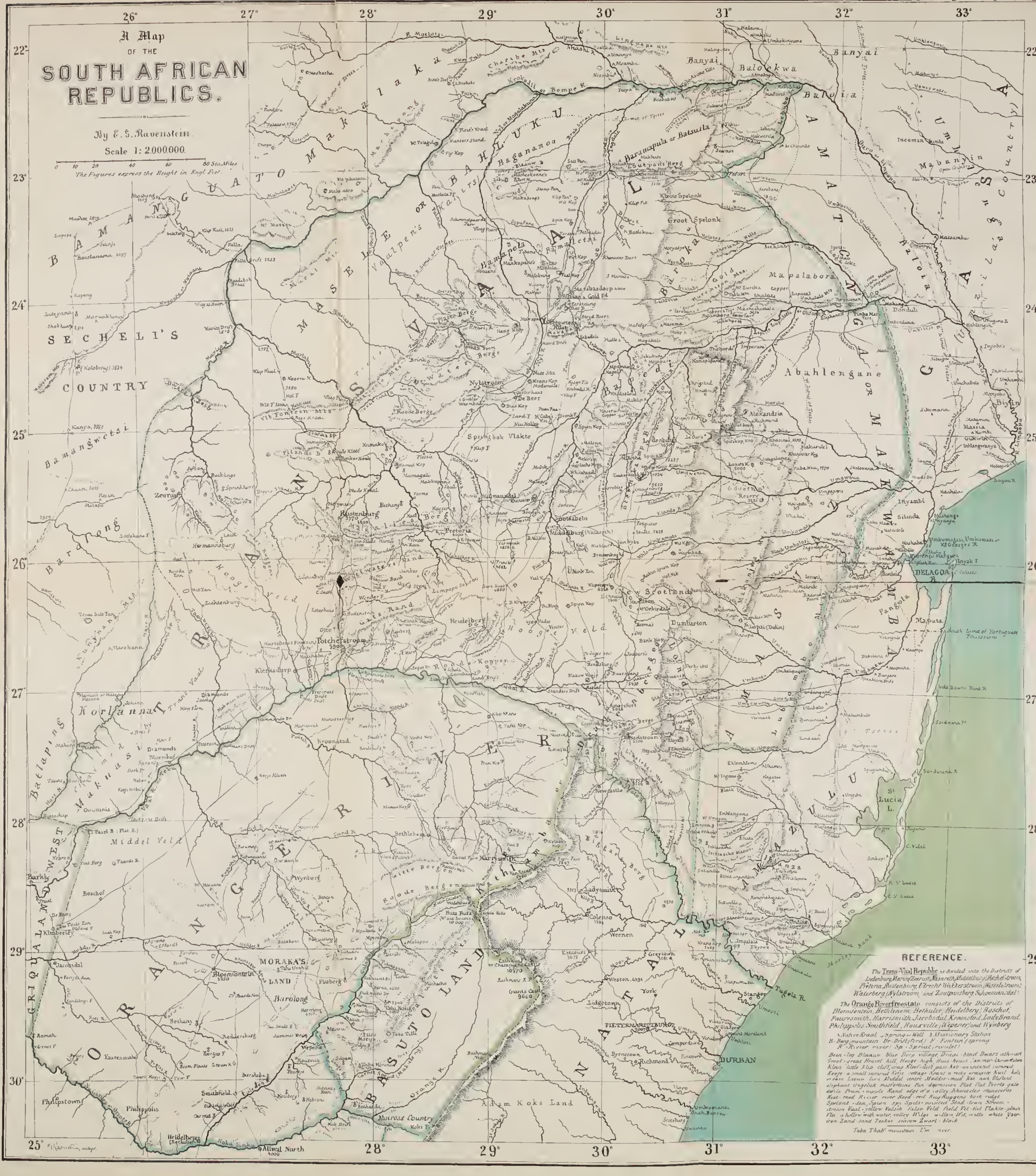
The Office of THE GEOGRAPHICAL MAGAZINE *is at* 57 *&* 59, *Ludgate Hill, E.C.*

Manuscripts sent to the Editor cannot be returned, nor can the Editor be responsible for them.

Letters and Articles intended for insertion should be written on one side of the paper only, and must be accompanied by the name and address of the writer; not for publication, but as a mark of good faith.

The right of translation is reserved.

Annual Subscription and Postage, £1, *Inland. Foreign Orders must be accompanied by P.O.O. or Cheques to include the full amount of Foreign Postage. Post Office Orders to be made payable to Messrs. Trübner & Co.,* 57 *&* 59, *Ludgate Hill, London, E.C.*



A Map
OF THE
SOUTH AFRICAN REPUBLICS.

By E. G. Ravenstein.
Scale 1: 2,000,000.

The Figures express the Height in Engl. Feet.

REFERENCE.

The Trans-Vaal Republic is divided into the Districts of Lydenburg, Marico (Zeerust), Nazareth (Middelburg), Potchefstroom, Pretoria, Rustenburg, Utrecht, Wakkerstroom, Wesselstroom, Waterberg (Nylstroom) and Zoutpansberg (Schoemansdal).

The Orange River free state consists of the Districts of Bloemfontein, Bethlehem, Bethulie, Heidelberg (Boschof), Fauresmith, Harrismith, Jacobsdal, Kroonstad, Ladybrand, Philippolis, Smithfield, Rouxville (Wepener) and Wynberg.

K. Native Kraal ⌄ Spring or Well ♁ Missionary Station
B. Berg (mountain) Dr. Drift (ford) F. Fontein (spring)
R. Rivier (river) Sp. Spruit (rivulet)

Been - leg Blaauw blue Dorp village, Draai bend Dwars athwart Groot - great Heuvel hill, Hooge high Huis house, Jammer lamentation Klein little Klip cliff, crag Kloof - cleft pass Kop - an isolated summit Kopje a small summit Kotje cottage Krans a rocky precipice Kuil hole or cave Leeuw lion Middel centre Modder - mud Nek neck Olifant elephant Ongeluk misfortune Pan depression Plat flat Poorte gate Duivel devil Pram - nipple Rand edge of a valley Rhenoster rhinoceros Riet reed Rivier river Rood red Rug Ruggens back ridge Spelonk den, Spion spy Spits pointed Stad town Stroom stream Vaal yellow Valsch false Veld field Vet fat Vlakte plain Vlei a hollow with water, valley Wilge willow Wit white Yzer iron Zand sand Zeekoe sea cow Zwart black

Taba Thaba mountain Um river.

THE

GEOGRAPHICAL MAGAZINE.

FEBRUARY, 1877.

THE SOUTH AFRICAN REPUBLICS.

The countries which form the subject of the large map of the present number of the *Geographical Magazine* have recently come prominently before the public in connection with native wars. The Orange River Free State and the Trans-Vaal Republic were founded by emigrant Boers, dissatisfied with the British Government. The latter was inimical at first to the establishment of European States close to their own frontier, but in the end acknowledged a condition of affairs which could not well be helped. These countries have undoubtedly a great future before them, and although many of the old Boers are hostile to the proposed South African Confederation, preferring rather to move further into the interior, there can be no doubt that the realisation of this scheme, by introducing a more stable government and attracting European settlers, would in the end prove of immense benefit. The resources of the two Dutch Republics are great already, and their development is merely a question of time. No country is better suited to the breeding of cattle than the uplands at the western foot of the great dividing range, and the mountain valleys are distinguished by fertility, and rarely suffer from drought. The mineral wealth of the country is immense, especially in the Trans-Vaal. The principal gold fields are indicated upon our map. Coal of superior quality is found in all the mountains between the heads of the Orange River and the Limpopo. This is all the more important, as none of the rivers are navigable throughout, not even the Limpopo, and an ample supply of fuel for railways is thus available.

Copper, lead, zinc, graphite, nickel and cobalt have been discovered, and mines are being worked in a few places. The relations between the Boers and the natives, unfortunately, are not of the most friendly nature. The boundaries of the Republics as laid down upon maps or described in proclamations are illusory, for within them dwell numerous tribes which are perfectly independent of the Boers, and resent every interference with their freedom. Conflicts are thus unavoidable. Where the native tribes have been forced to submit, they are treated harshly. They pay higher taxes than the Boers, are forbidden to acquire land, or even to ride on horseback.

The Orange River State (area, 44,430 square miles) has a population of about 57,000 souls, of whom 20,000 are Bechuanas. The population of Trans-Vaal (area, 114,400 square miles) is 250,000 according to President Burgers, of whom 50,000 are said to be whites. The Rev. A. Merensky estimates the population at 250,000 or 300,000 souls, including 25,000 or 30,000 whites. Amongst the natives there are, according to this competent authority, 60,000 Amaswasi and Matebele Kafirs, 140,000 Basutos, 70,000 Batsoetla and Masele, and 70,000 Bechuanas, besides a few Hottentots on the Lower Vaal and Bushmen on the table-land between the Elephant and Vaal rivers. The area and population of the British Colonies of South Africa and of the two Dutch Republics, are as follows:—

	Area, square miles.	Population.
Cape Colony	195,880	720,984
West Griqualand	16,630	25,500
Basuto Land	8,660	75,000
Kaffraria and East Griqualand	16,030	210,000
Natal	18,750	307,241
Orange River State	44,430	57,000
Trans-Vaal Republic	114,440	275,000
	414,820	1,670,725

The Portuguese occupy a port in Delagoa Bay, but though the whole of the country down to lat. 26° 30′ south has been declared by arbitration to be legally their own, their virtual influence hardly extends beyond the range of their guns. They have come to some agreement about the boundaries with the Dutch Boers, by permitting these latter freely to export their produce through Delagoa Bay. The Boers, however, are naturally anxious to obtain a direct outlet to the sea, and the future must show whether they look upon this compromise as a permanent settlement of the question.

Our map is based to a large extent upon the labours of Mohr, Mauch, and others, which have been published from time to time in Dr. Petermann's *Mittheilungen*, accompanied by maps of superior excellence. We have likewise embodied in it the result of more recent explorations, particularly those of the lamented St. Vincent Erskine, who explored the Limpopo and the country to the north of Delagoa Bay, more fully than had been done by his predecessor Mr. Elton. A large portion of the Trans-Vaal Republic is based upon a map by the Rev. A. Merensky, the superintendent of the Berlin Missions in South Africa.[*] Mr. Merensky places Lydenburg, a cardinal point, in long. 31° 31′ E., on the authority of Mauch and St. Vincent Erskine. Neither of these travellers, however, has made an observation for longitudes there; and the latter, in a valuable paper published in vol. xlv. of the *Journal of the Royal Geographical Society*, rectifies his previous statement, and places Lydenburg in lat. 25° 5′ S., long. 30° 37′ E. This position we have accepted. We have laid down upon the map the routes recently travelled over between Natal and Delagoa Bay, by Mr. Percy Hope,* as well as a route from Lydenburg to Lorenzo Marquez, by Dr. E. Cohen.† Natal has been delineated from Mr. A. Mair's large map, published in 1875. Amongst minor authorities, we mention a map of South Africa, by Charles Solomon, published at Cape Town in 1875.

---

[*] *Zeitschrift für Erdkunde*, vol. x. 1875.

THE ABBE ARMAND DAVID'S TRAVELS IN CHINA.‡

In a previous number of this Magazine (vol. iii., part vi.) a sketch was given of Abbé Armand David's travels throught he western provinces of China, Hupe, Szechuen and Queichow, down to the time of his leaving that country in July 1870. The enfeebled state of his health, and the distracted condition in which he found France on his return, obliged Père David to remain longer in Europe than he intended, and it was not till March 1872 that he returned to China to resume his study of the natural history of this little-known empire. Père David has now published an account of his travels (from Peking to Shensi and Hupe, and into Kiangsi) between this date and when he was compelled, by continued sickness, to leave China for good.

After a short trip to Ningpo, in the Chêhkiang province, Père David took steamer from Shanghai to Tientsin, and thence proceeded overland to Peking. There he devoted four months to arranging the collection of specimens of natural history which he had organised at the Pei T'ang (Northern Hall), the Roman Catholic establishment situated just outside the Forbidden City or Palace grounds; and it was not till the 2nd of October that, an agreement having been made with two carters to carry the Abbé, his two attendants—who acted in the double capacity of servants and *chasseurs*—and 400 lbs. of baggage to this town, or a distance of about 900 miles, for the sum of about 52 taels silver (about 15*l.*), and an additional six shillings for each day's delay caused by Père David for his own purposes. a start was made for Si-an-fu, the provincial capital of Shensi.

On the 4th of October, having travelled about 80 miles, the party reached the small town of Peiho, where they found an *ambassade* of Tibetan lamas, returning home at the expense of the Government from Peking, whither they had been sent by the Dalai Lama to offer his homage to the Son of Heaven. Père David, out of curiosity, paid a visit to the head of this mission, who was a *Hwo-fo* or incarnate Budha. He found him seated behind a table covered with red silk, and arranged like an altar, with sticks of incense burning before him. At his side was a bottle of warm spirit, of which, from time to time, he swallowed in a majestic manner a small glass or two. The holy man did not show the slightest sign of consciousness of the intruder's presence, but his suite expressed their dissatisfaction at the stranger's daring indiscretion in entering the presence of their living idol without prostrating himself.

As the route tends southward, the Si-shan or western hills, a range extending from Peking to the northward bend of the Yellow River, gradually lose their elevation, and the country broadens out more and more into sandy plains, upon which cotton, sorghum, ground-nuts and sweet potatoes are cultivated in abundance. After six days' travel, Ching-ting-fu, a very large town surrounded with fine massive walls resembling those of Peking, but said to contain only some 10,000 inhabitants, was reached. It is the residence of a Roman Catholic bishop, and boasts of a magnificent Gothic church of recent construction. No halt, however, was made here, and on the 14th of October the party passed across the border from Chili into Honan province. On the broad plains here, large numbers of wheelbarrows fully laden were met scudding under sail before the south wind. Rain overtook the party, and compelled them to suspend their journey for a while. The roads were rendered almost impassable, and travelling for some days became most laborious, the carts sinking to the axle-trees in thick black mud, to cleanse the wheels of which and to rest the exhausted mules frequent halts had to be made.

On the 24th of October the Yellow River was reached. Père David found it about 3 miles broad; but it was evident from the large tracts of mud, dry at this season, extending on both banks—if banks, they can be called, so slightly are they above the bed of the river—that in summer it must attain a much greater breadth. The bank was reached at 6 A.M., but Père David had to wait four hours before the ferrymen, having by that time finished their morning meal, were ready to man the boat; by this time a crowd, chiefly small tradesmen, anxious to cross, had assembled. Owing in some places to the rapidity of the current, and in others to shoals, the crossing was naturally a matter of some difficulty; but when nearly across, the ferrymen purposely ran the boat aground on a long low-lying mud-spit, and commenced levying an extra *pourboire* as the price of taking her to the usual landing-stage. Père David, however, while stating it to have been his intention to have given a handsome gratuity on landing, resolutely refused to make any promises before reaching the proper stage. The ferrymen thereupon expressed their determination, under the circumstances, to remain where they were for the night. The other passengers made their way ashore as best they could, but as the yielding nature of the spit would not allow of the carts being landed there, Père David, after vainly endeavouring to induce the boatmen to continue the passage, sent one of his attendants with his passport ashore, in a boat which happened to be passing, to the nearest magistrate. The boatmen commenced preparations for their evening meal, but Père David losing patience at this *nonchalance*, drew a revolver and threatened to put a bullet through the first pot which should be set on the fire; and they, not appearing to relish the idea of a meal of uncooked rice, concluded that the best policy would be to yield to the impetuous foreigner, weighed anchor and brought the boat to the landing-place. They had, however, carried matters too far. Père David's messenger had in the meanwhile landed and made for the nearest magistracy. Magistrates in China are usually credited with a strong antipathy to all foreigners, and to propagandists in particular, but this belief is probably in most cases the outcome of exaggeration. In the present case, at least, the magistrate could scarcely have done more than he did: no sooner was the passport shown and the charge laid, than runners were dispatched to arrest the boatmen, and these latter only obtained their release on payment as fine of a larger sum than was represented by the gratuity which, in spite of their ill-behaviour, Père David presented them with on leaving.

---

* *Journal of the Royal Geographical Society*, vol. xliv.

† *Second Annual Report, Hamburg Geographical Society.*

‡ *Journal de mon troisième voyage d'explorations dans l'Empire Chinois*, par M. l'Abbé Armand David, de la Congrégation de la Mission, &c., &c. 2 vols. Hachette et Cie. Paris, 1875.

From this point the route, instead of, as hitherto, following a southerly direction, turns off almost directly west across the *loess* country. In Mongolia Père David found amongst loess fossil remains of *Elephas primogenius*, *Rhinoceros tichorhinus* and of many unknown kinds of *cervus;* and he, therefore, agrees with Baron von Richthofen in thinking that, when sufficiently explored, it will yield evidences also of the contemporaneous existence of man. Like Mr. Kingsmill, however, he rejects Richthofen's theory of the formation of this enormous deposit as the result of vegetable decay through countless centuries, aided by deposits, wind-borne from the neighbouring hills, of soil and disintegrated rock. He believes this "to be one of the causes, because it would explain to a certain extent many phenomena, such as the existence in it of unbroken land mollusks, the dispersion of fossils of land mammals, and above all the absence of strata. But this theory does not appear sufficient, in his opinion, to account for facts of the greatest importance with regard to the formation of this diluvium, its presence in certain tracts, and its absence in others, its uniformity of composition everywhere, and its independence of that of the rocks underlying it, &c." His own opinion of the cause is that during an aqueous period a sudden upheaval of the mountains of Shensi and Eastern Honan was caused by a combustion of the coal deposits due to the decomposition of sulphide of iron. This upheaval intercepted the course of the Yellow River, and caused its waters to fill up the basin thus formed. This action was, he believes, likewise aided by heavy rainfalls which washed down from the surrounding mountains shells, remains of mammals and immense quantities of soil, thus giving the loess the colour, as it always has, of the soil of the neighbouring mountains. In view, however, of the fact that this loess is the distinguishing characteristic of almost the whole of North China, and, according to Richthofen, "determines the physical features of a region at least 250,000 square miles in extent," the theory of its formation here propounded can scarcely be accepted as a satisfactory or adequate one.

When undermined by water the loess has a tendency to break into rifts or gullies, the sides of which are usually hollowed out into caverns, which serve as habitations for the poorer class of people. The roads also follow these rifts, which are in places so narrow that two carts cannot pass, and when two do meet it is sometimes necessary for one to go backwards a couple of miles to allow the other to pass: these rift-walls are in places of extraordinary height, in some places 200 feet, or even more, and almost always perpendicular.

The further the party proceeded westward, the greater was the number of ruins they met. Père David complains bitterly of the delay which was occasioned by repeated examination of his passport at the various guard-houses in Tungkwan, the entrance to the narrows at the bend of the Yellow River. But when we consider the great strategical importance of this town, as the key to the entrance into the provinces of Kansu and Shensi, it is scarcely surprising that in view of the unsettled state of the country at this time, it had been found necessary to exercise the greatest watchfulness over all who passed in and out.

From this point the route left the Yellow River to follow the course of the Wei River. All towns and villages here are described as being surrounded with moats and massive walls, but these had proved but an insufficient protection against the attacks of the Taiping and Panthay rebels. The houses, especially as regards the roof, are remarkable for their ornamental and elegant style; but almost every building, and, without exception, every pagoda or temple—a statement corroborated by Von Richthofen—had been destroyed; the people, or such as were left (for Père David computes that the population does not number over one-fifth of what it was previous to the incursions of the rebels), appeared sullen and distrustful, were clothed in rags, and, compared with the inhabitants of Honan, decidedly ugly. Iron abounds, and outside the ruined pagodas were seen large lions cast in iron, and enormous chandeliers of the same material, sometimes 40 to 50 feet high.

On the 3rd of November Si-an-fu, the provincial capital, was reached, and after an hour's detention for the examination of passports, the party proceeded to the Roman Catholic mission there. From the bishop, Père David learnt that, owing to the Panthay rebellion, to follow out his plan of proceeding into Kansu would be impossible, and that he must content himself with exploring the Tsing-ling, a range of mountains extending from the uttermost boundary of Shensi, along the southern bank of the Yellow River, into Honan, and some of whose peaks attain an altitude of 11,000 to 12,000 feet. Whilst preparing for a new start, he fell in with a native priest who had travelled over a considerable portion of Central Asia, and from him obtained sufficiently detailed information to satisfy himself of the existence—apparently since established as a fact by Sir D. Forsyth, *vide Report on Mission to Yarkand in* 1873, p. 53—of camels with two humps in a wild state on the plains between Kansu and Kashghar.

On the 11th of November a start was made in a large three-mule wagon. The increasing ruggedness of the route did not, however, admit of this mode of conveyance being utilised further than Shihking-ts'üan (Fountain of the Stone Well), a small Christian hamlet reached on the evening of the same day; and on the following morning the Abbé pursued his way to another Christian hamlet, situated further up the hills, and named Inkiapo, according to the French method of romanising Chinese sounds, where he remained some days. The hills consist here chiefly of greenish gneiss and flinty micaceous schist, and are generally denuded of trees; where, however, these are allowed to grow, the chestnut, oak, walnut, and other denizens of the north are found clumped with trees of purely southern growth, such as the *Rhus vernicifera*, *Cornus*, *Rubus*, *Cephalotaxus*, &c. The skin and skeleton of a leopard of more than average size were purchased from a neighbouring hamlet; and one of these animals having carried off a dog during the night from an adjoining house, Père David, at the earnest request of the villagers, sallied forth in search of it. It is traced down to a neighbouring copse, but the beaters do not relish making a closer acquaintance and retire; Père David, however, notices something moving, and aiming at it, brings it down. After waiting a considerable time to be sure that life is extinct, he enters the clump to examine his game, when he finds that he has mistaken for a leopard's eye the bright neck of an innocent partridge (*bartavelle*)*!* Antelope and wild boar appear to be very common on this range; musk-deer and porcupines were also met with, and at some distance monkeys were also said to abound.

On the 10th of December, Père David pushed in a south-westerly direction further into the heart of the range. In the valleys, at its base, potatoes and maize were cultivated in small quantities: the mountains themselves were but sparsely inhabited by wood-cutters, whose huts were scattered over the slopes, and who devoted themselves exclusively to the felling of timber—a work which is progressing with such rapidity as to promise the entire denudation of the mountains, within a few years, of those forests of pine which, until the immigration a few years since of these wood-cutters from the neighbouring province of Szechuen, were "primeval and uninhabited." Owing to the inclemency of the weather, which had covered the mountains with snow and ice, few or no specimens could be obtained, and the party had to return to Inkiapo.

Here, after many futile endeavours, Père David succeeded in obtaining some specimens of a bird, which, like an *ignis fatuus*, seemed always to elude his grasp just as he was most certain of catching it. The Chaoho-lo, which Père David says is named "*éteignez le feu*" from the fact that its notes are mostly heard after the evening meal, when the fire is no longer required, but much more probably because this is a close reproduction of its note, is about the size of a thrush, of an olive tint on the back and white beneath, with black patches on the breast, and a deep brown over the ears, forehead and legs. Père David recognised it as a new species of *Pomatorhinus*, and named it *P. Gravivon.*

While staying at Inkiapo, Père David occupied the apartments set apart for the priest—a native, named Chang—on his annual visitation to this district. Soon after the Abbé's return from his excursion to the Tsing-ling, the priest sent notice of his approach, and the former had to seek other quarters. It is amusing to notice the bitterness which characterises the description of the visitor's progress, and the diatribes indulged in against Chinese obsequiousness to those in authority. Seated in a chair, borne by four Christians clothed in red, and preceded and followed by a numerous *cortége*, his approach heralded by the discharge of fire-crackers and petards, Père Chang advances up the slope of the hill perfectly unmoved by all these attentions, and so impressed with his own worth or so unconscious of his surroundings as, to Père David's deep concern, never to think, as the former expected he would have done, if only for considerations of humanity, of dismounting and walking when the road became steep and trying. Père David avails himself of this opportunity to inveigh against the *manières mandariales* of the native priest and the *excessive obsequiosité* of the Christians. Putting aside the question of the appropriateness or otherwise of such a bearing on the part of the preachers of a religion founded in meekness and humility, it is interesting to note the impression it creates in the mind even of an ecclesiastic when he views the matter from the standpoint of an outsider. Had he pursued this train of thought somewhat further, he might have comprehended that it is this very arrogance and assumption of *manières mandariales* on the part of all members of the Roman Catholic religion, from the lowest acolyte up to the bishops—whose progresses, as chronicled with the greatest pride and self-satisfaction in the *Annales de Foi*, are made to compete with and, if possible, surpass in *éclat* and magnificence the visitations of a viceroy—that render the Chinese government inclined to view their communion not as a religious, but as an aggressive political organisation, that give rise to most of the hatred and hostility entertained towards it, and afford the most serious obstacles to the spread of their religion. Into the present instance, however, a more personal element perhaps entered, and pride of race may have been the source of the bitterness undoubtedly experienced. This, at least, seems to be the key-note to the following sentence: "At the side of a Chinese who does not even take the trouble to fill his own pipe himself, it is but a sad figure that is cut by a foreigner, who wearies himself out every day, wearing no clothes but the commonest, and performing without cessation work of the meanest character."

The houses in this, the S.W., portion of the province compare very unfavourably with those in the northern and more prosperous portion. Père David, however, noticed that the inhabitants here as well as of the west of China generally differ much from the *li-min* or black-haired race of the east. They have fair complexions with bright colour, ruddy beard and hair, and eyes of chestnut hue. They seem, too, to differ from the majority of Chinese elsewhere, in a fondness for a great variety of colour and display in clothing. "The colour of the clothes worn by children and the young generally is a bright scarlet; red trousers, red robe, and sometimes red stockings. In the case of which I speak (the 16th of the first moon, when the young married ladies are said to return for a few days to the paternal roof) the toilette of the Chinese lady, generally so simple and so modest, is truly dazzling in this part of the country. The head is adorned with a sort of diadem surmounted with garlands of gold and silver; the wide trousers and long robe of silk are trimmed with embroideries of blue, green and black, which serve to tone down somewhat the brilliance of the scarlet ground; the little shoes, resembling in shape a goat's hoof, glitter too with a richness of satin and abundance of ornament unknown elsewhere."

This province, especially the loess ground of the north, seems to enjoy an extraordinary fertility: flour, in spite of the large quantity of grain required for the support of the army in Kansu and Yünnan selling at 13 or 14 cash (say three-fifths of a penny) per pound, or at a fifth of the price at Peking. In the same district coal was selling at the pit's mouth at 100 cash per 1000 catties, or about 9*d.* per ton. In the S.W. portion Père David saw abundance of anthracite, very hard in quality, and so difficult to light that the furnaces once lit were not allowed again to go out; it gave out no smell, and was smokeless. At the pit's mouth it was remarkably cheap, and even where Père David saw it (he does not state the distance from the mines), it only cost a cash a catty, say 7*s.* 6*d.* per ton. When broken it assumed not a prismatic or cubic, but conchoidal form. Though unable to find any traces of leaves in the coal, Père David is of opinion, looking at the rocks amongst which it is found, that the coal is of great antiquity; owing, however, to considerable local confusion it is difficult to trace any succession of the strata, and in view of the great abundance of sulphur in the vicinity, he is inclined to account for this confusion by (apparently a favourite source with Père David of geological displacements) spontaneous combustion of the coal at some period caused by the oxidation of sulphide of iron with which the rocks abound

In his travels, extending over three months in southern Shensi, Père David scarcely found 150 different species, and of these but four could be considered as new, viz.:—*Ithaginis sinensis*, *Pomatorhinus gravivon*, *Pnœpyga halsueti*, and *Uragus lepidus*. He started, however, in winter, and though he professes to consider this the best time as likely to show the species indigenous to each locality, it must be allowed that it is not a favourable one for the acquisition of a large number of specimens.

From Inkiapo, he passed along the Wei-ho to Szeyüan-shang, with the purpose of proceeding into Yünnan, but failing to obtain any luggage-bearers to accompany him, he was forced to return to Yenkia-to'un, and thence proceed in a S.W. direction to a Christian hamlet, Wangkia-wan, near Han-chung-fu, where he determined to remain. The road—presumably the old road constructed some 1600 years ago—lay directly across the Tsing-ling, which at this season of the year especially presented a dreary, monotonous aspect. On the 26th of February, Père David emerged into the open, well-cultivated plain in which the town is situated; and here and in the neighbourhood he remained until the 15th of April. The Abbé did not succeed in adding much to his collection, and nothing occurred during his stay there of interest, except, perhaps, an exemplification of the method employed locally to capture a swarm of bees. A man began by shaking at the end of a bamboo an old conical hat very gently until it was quite close to the bees. Inside the hat was hung a piece of cloth, in the shape of a bell-clapper, which, as well as the inside of the hat, had been saturated with salt water. This speedily attracted the swarm, which attached themselves firmly to the soaked surface. Those bees which were slow to enter were hastened by a gentle brushing with a bundle of artemisia (?*pyrethrum*) twigs fixed at the end of a pole. When all the bees had attached themselves, they were carried, without fear of stinging, to a hive which had been already prepared near at hand. The hives were generally made of hollowed trunks of trees. When it was desired to take away the honey and wax, the bees were stupefied with the fumes of burnt joss-stick (sticks of incense); or more frequently they were compelled to leave the hive for a time by fumes of the same substance, and, during their absence, as much of the comb was cut out as required.

On the 17th of April, Père David embarked with his two *chasseurs* at Chênkow-chên, a small town on the Han River, a little below Han-chung-fu, on board a boat so well laden with tobacco, rice and slate from the Liang-shan, that there was scarcely room to sit. As is usually the case the boatmen were opium-smokers, but the indulgence in this habit—indeed, in spite of much that is said to the contrary, it enables the endurance of a much greater amount of work of exposure amongst this class than could otherwise be borne—did not dull the master's mercantile instinct. He lost no time in investing the half passage-money, which had to be paid in advance, in an additional quantity of rice, which, however, as it eventually proved, gave the boat a dangerous draught of water. The distance from Han-chung-fu to Hing-an-chow is stated to be 1240 *li*, say 410 miles; the same distance thence to Laoho-k'ow, 60 miles above Siangyang-fu, and 1360 *li*, or 450 miles from the latter place to Hankow, in all 1270 miles. The journey occupied twenty days, and as Père David travelled in a native boat and appears to have had to submit to the usual delays at barriers and customs' stations, this may probably be accepted as the time which would be ordinarily required by Chinese boats to perform the journey. The river would appear, however, to be but ill-adapted for use by any but vessels of the lightest draught; for above Kiun-chow it is described as but one succession of dangerous rapids (one rapid alone was two-thirds of a mile in length, at another place they continued uninterruptedly for nearly three miles), for the navigation of which local pilots are taken by boats passing; and below that town navigation is interrupted and impeded by shoals and sand-banks. How fraught with danger is the navigation of the upper portion of the river is shown by Père David's experiences. Two days after starting the boat struck a rock in passing a rapid, where another junk was already lying wrecked, but fortunately without any damage being caused; three days later, after successfully weathering two very violent rapids, the boat was dashed to pieces in a third. On the same day three other junks were either disabled or entirely lost on or close to the same rock on which Père David's was wrecked; and before the last rapid on the downward voyage was passed, at least one other large junk was seen *hors de combat.* But little of the cargo was saved, the rice portion sinking immediately. Père David, however, by immediate strenuous efforts, while the master and crew were abandoning themselves to vain lamentations, succeeded in rescuing the larger portion of his baggage and collection of specimens, though of course more or less damaged by the immersion. Having charitably dispensed a gratuity to the owner and captain of the lost junk, Père David engaged passage in a boat laden with wood to Laoho-k'ow, which is described as a shipping port of no mean importance, where was seen anchored a multitude of junks of all sizes and forms, an evidence—each shipping centre having a special style of build easily recognisable—that the business carried on there must extend its branches to all parts of the country. Here a more commodious boat was hired for the last stage of the journey, and Hankow was reached without further adventure on the 7th of May.

During the few days he remained at Hankow, Père David had the pleasure of again meeting M. Garnier, the leader, on the death of M. de Lagrée, of the expedition sent from Saigon up the Meikong River, through Yünnan to the Yang-tze. Having determined to study the fauna and flora of Kiangsi and especially of that portion of the province which borders Fukien, Père David took passage in a river steamer, built on the model of the American ferry-boats, to Kiukiang, which town he reached on the 11th of May. Here he remained a few days at the Roman Catholic Mission, the members of which were French, and then, the waters of the Poyang lake and canals being very low, he started overland for the S.E. portion of the province. But the journey was far from an agreeable one. Unpleasant as in some respects the passage down the Han in a cramped boat had appeared, it contrasted favourably with the present one; the inns were dirtier and less commodious than elsewhere; the chair-bearers fell sick and had to be left behind, and one of those hired to replace them took the earliest opportunity to disappear with the wages which had been advanced to him. Frequent downpours of rain were encountered, and consequently bad roads. However, on the 31st of May the party reached Fuchow-fu, where the Mission has an establishment under the charge of M. Anot, to whose devotion and energy Père David pays a high tribute of praise.

From what Père David says, it would seem that though the Christians suffered no less than the majority of the inhabitants of Kiangsi from the ruthless destruction of the Taiping rebels, their numbers, at least in this province, are annually increasing. Perhaps this is to no small extent due to the influence which is being exerted through the *Sainte Enfance*, an institution established for the reception of children cast away by their parents. Infanticide, especially of daughters, is stated to be very common in this portion of the province, and as many as 1300 of these little castaways have been at one time in the nurses' hands. When old enough they are put out amongst Christian families, and of course educated in the tenets of this religion. They appear to be much sought after as wives, partly because they are better educated than other girls, and partly because the husband has only to give to the *Sainte Enfance* half the sum he would have to spend in ordinary cases of betrothal. Père David seldom has a good word to say of the Chinese character; chicanery, falsehood, ingratitude, are terms of constant application to them throughout his notes, and conversion to Christianity does not appear to work much reform. As a rule he seems to look at the religious question in a very fair spirit, and his opinion, therefore, of the chances of Christianity in China may not be uninteresting.

"The Christians," he says, "throughout the Empire were much more numerous formerly than they are now. To speak of Kiangsi alone, I am told that there is not a town which had not at one time its Christian chapel or chapels. But taking the whole of China the Christians can scarcely number one to a thousand heathen. And although in the Eighteen Provinces the conversions are continually growing more frequent, the general conversion of this people, if it ever takes place, can only, in my opinion, be looked forward to in a future still very distant, especially as the continually increasing facilities for travelling and establishing missions in the interior of the country, are attracting more and more preachers of every conflicting sect. This deplorable divergence in the teaching and practice of Christianity is for the Chinese a *seminarium* of indifference, because they are thus led to believe that each western nation has a religion of its own; and they think they are no less justified in maintaining their own. This is a conclusion which occurs naturally to the mind of a man who will not and cannot study the *religious* question."

After a few days' rest, Père David started for Ts'i-tu, a small village not far from the prefectural city of Kienchang, where he proposed to make his head-quarters for the summer, which was to be spent in excursions into the range of mountains forming the boundary between Kiangsi and Fukien. Intense heat and illness prevented the execution of this design. The surrounding country is devoted almost exclusively to the cultivation of rice, and the marshy nature of these fields gives rise to a severe and dangerous kind of fever. Père David's Peking *chasseurs* had no sooner arrived than they were attacked, and were scarcely convalescent before the Père himself fell very ill with it. The characteristics appear to be extreme nausea and entire loss of appetite, intense burning in the head, and racking pains accompanied by more or less delirium. Unprovided with medicines, he could only let the fever run its course: he witnessed, however, a mode of treatment recommended by a Chinese student of medicine, which appears to have been not ineffective. This is it: boil a hen's egg quite hard, take off the shell and then roll it gently, so as not to break it, over the invalid's stomach, replacing it in warm water from time to time to prevent its getting cold. The egg is supposed to absorb the *fluides morbides*, which cause the sickness, and Père David mentions as a strange fact that the yolks of eggs used for this purpose were, after the operation, thickly covered with wort-like excrescences, which they have not when rolled in a similar manner upon a piece of wood or stone.

As soon as he became somewhat convalescent, Père David started to explore the mountains forming the boundary between Kiangsi and Fukien. But during his stay amongst them (from the 9th of October to the 1st of December) he was almost uninterruptedly sick, first from a relapse of his fever and subsequently a complication of fever and pleurisy, which brought him to death's door. Even when recovering from these severe illnesses he was too weak to be able to make excursions amongst the hills, and was forced to depend for specimens upon the mountaineers whom he took into his service The mountains here in their highest portions are computed to attain an elevation of 10,000 feet; several species of pheasant, including the taagopan, the Elliot, the silver, and those with a collar and without, abound. Troops of monkeys also roam over the hills, changing their location according to season and the food obtainable. There appear to be at least two species, one of a brown colour, the other yellow, with a grayish tint when young and bright red at mature age; the troops are always under the direction of one full-grown male, who keeps watch and directs all movements: the remainder of the troop are females and young, the latter (when males) apparently separating as soon as full grown, to form troops of their own.

Thoroughly worn out with sickness, Père David was forced to abandon his proposed explorations, and return without loss of time to Kiukiang: and failing to recover his strength there he proceeded on to

Shanghai, and took passage in the M.M. steamer to Marseilles.

The list of all the specimens obtained is not yet completed, but of the value of Père David's contributions to scientific knowledge, in spite of his ill-health, some idea is given by the following enumeration of the number of new species discovered: 764 species of birds, or 232 more than all those of Europe, were captured, of which 146 only, chiefly water-fowl and birds of prey, are found in Europe, and some 60 more, chiefly aquatic, in North America; 9 species of squirrels, of which two are known in Europe; 30 of *mus*, of which the only European species is the *Mus decumanus*; 12 kinds of tortoises, none European; 19 lizards; 35 snakes; 4 salamanders; and 13 batrachians, all new. The coleoptera belong, in great part, to European genera, but are of different species, whilst amongst the beetles, no European kinds were found.

Beyond, however, the domains of his own speciality, Père David's speculations and even assertions can only be accepted with the greatest caution. They are characterised at times by extraordinary rashness and apparently almost entire lack of that critical spirit —one of the first requisites to scientific study—which prompts men, before putting forth any statement, to assure themselves of its strict accuracy by every means in their power. Among many instances, the following may be cited: He states (vol. i., p. 22), the foreign population of Shanghai at something less than 10.000, or at nearly four times its actual number; (vol. ii., p. 56) that large quantities of *mu'sh*, or fungus, are shipped from below Hanyang-pin to Hankow, on account of *Europeans*. On pp. 227, *et seq.* (vol. i.), he ventures an elaborate explanation of the reason why, when the graves of the dead are reserved sacred from tillage, the whole country, in view of its enormous population, and the antiquity of the custom, has not become one vast consecrated graveyard. This, he gravely states to be that, when a revolution occurs and a new dynasty succeeds in establishing itself on the throne, one of its first acts is to order not only the destruction of the imperial mausolea of the preceding dynasty, but the destruction and ploughing up of the tombs of all subjects who are unfortunate enough to have been buried previous to its own establishment. The only exception, Père David remarks, is the present Manchu dynasty, which, to secure the support of several powerful families, guaranteed their family tombs from destruction. What Père David's authority for such a statement is, it would be interesting to learn It has usually (there are exceptions prior to the present dynasty, even to this rule) been the custom for an individual who has succeeded in establishing his family upon the throne of China to raze the mausolea of the previous dynasty, but never, as far as we know, has he gone the length of destroying the graves throughout the empire. The restoration to agriculture of the sites of graves is effected not by the issue of an arbitrary edict, but by the gradual extinction of families or their removal to another portion of the empire. The present dynasty, it is true, so far departed from previous custom as not only to forbid the desecration of the imperial mausolea of its predecessors, the Mings, but even to sanction an appropriation of public funds for their maintenance; but they entered into no compacts with private families in this respect, and granted them no privileges. Indeed, so far from it, they abolished the style of dress and *coiffure* followed under the Mings, and rendered obligatory that now current, which is regarded, even to the present day, more or less in the light of a badge of servitude to a foreign race.

Judging from the statement (vol. ii., p. 207) made with reference to the settlement of the audience question—that to the French Minister, M. Geofroy, the credit of the settlement was solely due, all the other legations having declined to take any steps in the matter—the political disquisitions in these volumes must be accepted with no less caution.

Père David touches upon the much-vexed question of the population of China, and from statistics gained during his residence in Kiangsi is inclined to think that the population exceeds 300,000,000. He maintains that though the population of some of the provinces may have been diminished thereby to a half or even a fifth of its previous number, it has in no case been decimated as has been believed. He admits that many of the cities contain fewer inhabitants than might have been expected, but maintains that the population of the mountainous districts, where few or no inhabitants would have been looked for, counterbalances this. His calculation is based upon what he believes the population of Kiangsi. This province contains 13 *fu*, divided into 75 *hien*, 2 *chow* and 2 *ting*. The *hien** of Nanchên, which he holds to be a fair average, is divided into 55 *tu* or cantons, in the least populous of which Père David was staying. This contained 19 hamlets, and was believed to have about 1000 families: calculating 4 to a family, the population of the canton would be 4000 individuals, and of the district (*hien*) 220,000 and that of the province 17,380,000. Though many of the provinces are more sparsely populated than Kiangsi, many also have a much denser population; and Père David therefore thinks that this province may be fairly taken as an average, and hence computes the population of China at upwards of 300,000,000.

The latest official census, that of 1812, gives the population as 362 millions odd, and makes the average population in Kiangsu 850 to the square mile, 705 in Anhwei and 671 in Chêhkiang, and the average population throughout China as 266 to the square mile. In view of the fact that Belgium, the densest inhabited country in Europe, has but a population of 451 to the square mile, and British India of but 201, it is scarcely credible that these provinces could have been so densely populated as the above figures would indicate. But whatever was their condition in 1812, their population at the present time nowhere approaches it. The ruthless destruction and slaughter of the prolonged rebellions of the Taipings, Nienfei and Panthays, laid waste millions of acres of cultivated ground, and brought death to millions of their peaceful inhabitants. In the census above alluded to, the population of Chêhkiang is given at 26,256,784; but Baron von Richthofen, the most scientific traveller in China for years, from detailed calculations made when travelling through that province in 1871, estimated that the population could not at the outside exceed 8,100,000, not one-third of the earlier computation. Although Chêhkiang suffered severely from the devastations of the Taipings, the riverine provinces of Kiangsu, Anhwei and Kiangsi suffered at least equally severely: the northern provinces suffered also very severely from the Nienfei and the southern and western from the Panthays. Many of the provinces are now recovering with rapid strides, but after careful calculation, 200 would, in our opinion, be a liberal allowance per square mile, and we are inclined to join issue here also with Père David, and to state the population of China as little, if at all, over two hundred and fifty millions.

---

* Department is the word used, which in the same page is used as the equivalent of *hien* and *fu*.

Alfred E. Hippisley.

THE NORTHERN SIBERIAN EXPEDITIONS.

An interesting account of Professor Nordenskiold's recent commercial and scientific expedition from Norway to Siberia is to be found from the pen of Dr. Stuxberg, who accompanied the expedition, in the last number of Dr. Petermann's *Mittheilungen*. The following is a brief summary of the article:

Professor Nordenskiold left Tromso in the steamer 'Ymer' (Captain Ericson) on the 25th of July, and made direct for the Matochkin Shar, the straits separating the two islands of Novaya Zemlya, the coast of which was sighted on the fourth day after leaving Norway. At the western entrance of the Matochkin Shar they met with two Russian schooners engaged in salmon and other fishing. On the 31st of July they emerged into the Sea of Kara, and soon fell in with drift ice, which, however, soon proved to be impenetrable, and necessitated a retreat to the Matochkin Shar, and until August the 5th they lay anchored close to a ruined hut in which a portion of Rosmysslof's expedition in 1768-9 had wintered. The 'Ymer' then entered the Sea of Kara again, and sailed along the east coast of Novaya Zemlya as far as Burrough's Straits, and then pursued an easterly course towards the Yalmal peninsula, which, after frequent tacking, was sighted on the 10th. Seeing open water ahead they endeavoured to steam northward, but were soon encompassed by the pack. It was, however, apparent that the further they got from the neck of the Gulf of Kara the more scattered was the ice. The estuary of the Yenisei was reached on the 15th of August, and they then passed under the west coast of a hitherto unknown island called by them Siberiakoff Island. It appeared to be about 50 versts in length, and to be inhabited by a large number of reindeer. The depth of the river ranged between 5 and 15 fathoms, but shallows were not unfrequently found in the neighbourhood of the islands. A native named Feodor who had taken the boat up-stream the previous year, was taken on board, but he proved to be unable to pilot the vessel up; and at Korepofskoye the goods were unladen, and the interval, while awaiting the arrival of Dr. Theel and his companions, employed in geological and zoological researches.

The expected travellers did not, however, turn up, and on the 1st of September Professor Nordenskiold's party commenced their return journey. The strong current carried them further north than they had anticipated, and they followed much the same course as the 'Proven' took the previous summer. They passed the 75th parallel and then encountered a portion of the pack, along the eastern margin of which they coasted, entering the Matochkin Shar on the 7th, and reaching Hammerfest on the 18th of September.

The whole journey is described by Dr. Stuxberg as extremely pleasant; no storms were experienced, though a cloudy sky was the rule. The ice proved very obstructive in the Sea of Kara, but notwithstanding this the Doctor considers that the journey affords a further proof of the possibility of free navigation between Novaya Zemlya and the Yenisei.

Professor Nordenskiold intends to collect the journals of the Norwegian whalers since 1869, and to compare their observations with those taken by his expedition. These last were both frequent and varied. Although small hopes were entertained of making biological investigations, yet rich forms of animal life were obtained in the Kara Sea, and subfossil remains from the *tundra* of the Yenisei. The most noteworthy among the latter are a piece of mammoth skin about 1½ inch thick, some mammoth bones, and a musk-ox skull. The two animals would appear to have been contemporaneous at one time, though the former is now extinct. A large number of shells were also obtained from the neighbourhood of Korepofskoye.

The deposits of the Siberian *tundra* are of marine origin, and testify to the former presence of an Arctic Sea, similar in its fauna to the Sea of Kara. Two remarkable specimens were discovered, one a new species of sea-cucumber, and the other an *Umbellularia* about 1½ foot in length obtained from a depth of 130 fathoms. This last is a great rarity. Two specimens were obtained on the coast of Greenland and named *Isis encrinus* by Linnæus in the middle of the last century. This form of animal life was the subject of discussion and controversy till the Swedish expedition to Greenland in 1871 came across two specimens in Baffin's Bay; and others were subsequently found by the Challenger expedition between Portugal and Madeira, and near Kerguelen Land. The Austro-Hungarian expedition obtained some in 1873, between Novaya Zemlya and Francis Joseph Land, and during last summer others were found between Norway and Iceland. It is, in fact, a form of life of wide distribution but of extreme rarity.

The expedition* of Messrs. Finsch, Brehm and Zeil to the mouth of the Ob and the Sea of Kara naturally claims attention in treating of Professor Nordenskiold's journey in the same part of the globe. The Bremen travellers reached Obdorsk on the 13th of July, but, as a vessel suitable for navigating the Gulf of Ob was not obtainable there, they had determined to travel towards the Bay of Kara, to determine the possibility of uniting the basins of the Sea of Kara and of the Ob by a canal communication between the Poderata River, which flows into the Northern Sea, and the Chuchya, a tributary of the Ob.

Obdorsk was left on the 16th of July, and the same evening the travellers entered the smooth water of the Little Ob, a dependent channel of the great river. Navigation here became a matter of great difficulty, as the left bank was quite overflowed, and the whole surroundings a maze of canals and waterways, with occasional settlements or fishing huts on islands. At Yanburra they entered the eastern arm of the Chuchya

---

* See *Geographical Magazine* for November, 1876, p. 296.

River, and here Samoyedes were met for the first time. Dr. Finsch considers that, though they and the Ostyaks differ in regard to language, they are practically the same people from an ethnological and typical point of view. From Yanburra the travellers ascended the Chuchya with a reserve of Samoyedes and Ostyaks. The stream was broad and for the most part deep at that season of the year, but its numerous windings made navigation very slow. On the 28th the natives declared that the vessel could proceed no further, owing to the increasing shallowness and the presence of rapids. This determined the travellers to send back the *lotka* to the Lower Chuchya against the subsiding of the waters. The following day the journey over the *tundra* commenced in three sledges drawn by reindeer. These tundras consist of dwarf birches and moss in the higher parts, and mere swamp in the lower parts, the latter being of course almost impassable. The Ural range is seen bounding the horizon to the west, but the Samoyedes appeared to have no distinguishing name for it.

On the 1st of August the first stream belonging to the northern watershed was crossed, and the same day the Poderata River was reached. The travellers were compelled to return when within 10 miles of the Bay of Kara, as the absence of a boat, lack of provisions, and the impassable nature of the country, rendered further progress impracticable. To the left the Poderata was bounded by a range forming apparently a spur of the Ural chain; the stream itself, according to native account, lost itself in vast marshes, which discharged themselves into the sea.

The return journey was commenced on the 6th of August, and three days afterwards the limit of trees was reached, this being placed too far south on our maps. The Chuchya River was scarcely to be recognised; it had shrunk to the dimensions of a mere mountain-stream. On the 11th of August the travellers regained their boat at Chorneyar, and on the 19th re-entered Obdorsk.

Dr. Finsch remarks that their collections and notes cannot fail to be of value, and that even from a practical point of view it was important to have determined the question of a canal between the Chuchya and the Poderata, with a view of connecting the basins of the Ob and the Sea of Kara. This scheme is quite impracticable, owing to the frozen ground one would have to cut through, and on which a high atmospherical temperature does not seem to have any effect.

Dr. Finsch mentions that, in the course of their travels on the Ob, they met with a M. Polyakoff, who had taken a series of interesting photographs of Samoyede and Ostyak types. They also fell in with the 'Moscow,' a schooner chartered by the members of the Russian Society for the Promotion of Maritime Interests, who were desirous of examining the Gulf of Ob. Such a survey, as Dr. Finsch remarks, is very much needed, but to attempt to carry it out with such a crew and vessel is mere folly, and it was hardly to be wondered at that the 'Moscow' should soon after have been wrecked near Yanburra.

The Germans also met with the expedition under M. Matweyef, sent by the St. Petersburgh Society for the encouragement of Russian commerce to survey the water-parting between the Poderata and Chuchya. These gentlemen had ascended the Chuchya higher than the Germans, and had travelled 17 versts down the Poderata. Dr. Finsch does not state what opinion they formed regarding the possibility of uniting the two by a canal.

THE TEMPERATURE OF THE ATLANTIC OCEAN.

Appended to the last report (No. VII.) on Ocean Soundings and Temperatures obtained by H.M.S. 'Challenger,' and issued by the Admiralty, is a general summary of Atlantic Temperature drawn up by Staff-Commander T. H. Tizard. To those who care to investigate the principles by which the movement of the mighty waters are governed, even this summary will be found deeply interesting; and to others not engaged in tracing out these great physical causes, the knowledge of the thermal state of the deep sea cannot be without some interest, inasmuch as we have never had a series of observations so complete, or which could be so depended on, as those from which this summary has been derived. As the author himself was the observer, and had, as it were, a personal knowledge of his instruments, the remarks are of the greater value, and although, to some, the results deduced from these observations may not be conclusive, they cannot but acknowledge that the matter has been studied by Staff-Commander Tizard with much care and thought.

The want of space precludes our giving this paper *in extenso*, but we may extract such portions as will convey a general idea of the entire scope of the paper. Captain Tizard remarks, that "over a great portion of the Atlantic, the bottom temperature has this peculiarity. If the depth be less than 2000 fathoms we find the temperature at the bottom lower than that of any intermediate depth, but when the depth exceeds 2000 fathoms we find that the bottom temperatures are nearly the same as they are at that depth, no matter how much the depth may exceed 2000 fathoms, and this holds good for three-fourths of this ocean. In the remaining fourth the temperatures obtained at the bottom are much lower than in the other parts, and this fourth is not at either extreme where there is a large amount of surface cold, but occupies the whole of the western portion of the South Atlantic as far north as the Equator."

"If an imaginary line be drawn from French Guiana to the westernmost island of the Azores, and from thence due north, on the western side of this line the extreme range of our temperatures, at depths exceeding 2000 fathoms, is only 1°, viz.: from 34°·4 to 35°·4. Thirty-two observations of bottom temperature at these depths were obtained in this portion of the Atlantic." Rejecting three exceptional readings, "the extreme range of the remaining twenty-nine observations will be only 0°·6, viz.: from 34°·7 to 35°·3, and their mean will be 35°; and of these twenty-nine observations, sixteen only differ 0°·2. We therefore think ourselves justified in assuming that in that portion of the Atlantic west of the imaginary line the bottom temperature at depths exceeding 2000 fathoms is uniform at 35°."

On the eastern side of the imaginary line "twenty-seven observations of bottom temperatures were obtained at depths exceeding 2000 fathoms." The extreme range being 1°, the mean 35°·3, "we think ourselves justified in assuming that in this portion of the Atlantic the bottom temperature at depths exceeding 2000 fathoms is uniform at 35°·3."

"Between Tristan da Cunha Island and the Cape of Good Hope four soundings were obtained at depths exceeding 2000 fathoms, and here the bottom temperature was much colder, ranging from 32°·9 to 34°, the mean being 33°·5. It is, therefore, nearly certain that the uniform bottom temperature of 35°·3, which extends in the whole of the eastern portion of the Atlantic, does not extend further south than an imaginary line joining Tristan da Cunha with the Cape of Good Hope."

"It will thus be seen that a nearly uniform bottom temperature is found over three-fourths of the area of the Atlantic. In the remaining fourth, viz.: from the east coast of South America to a line joining Tristan da Cunha with Ascension, and from the Equator to the southward, the bottom temperature was invariably colder than that of any intermediate depth, no matter whether the depth was 500 or 2900 fathoms; and this temperature was found to vary from 31° to 33°·5, a bottom temperature of 32°·4 being found as far north as latitude 1° 45′ S., in 2475 fathoms between St. Paul's Rocks and Fernando Noronha Island; and another of 32°·7, in 2350 fathoms in latitude 2° 42′ S., between Ascension and the Equator."

"It appears, therefore, that the highest bottom temperature obtained in this portion of the South Atlantic (where the depth exceeds 2000 fathoms) is colder than the lowest bottom temperature obtained in any other part of this ocean (excepting close to the Faroe Islands), and that a temperature of 32°·5 extends in the western point of the South Atlantic nearly to the Equator, whilst in the remainder of this ocean the average bottom temperature is 2½° warmer, and this difference appears to be divided by a sharp line, on one side of which we get the cold water, and on the other side the comparatively warm water."

The cause of this division, Staff-Commander Tizard thus accounts for: "that there are a series of ridges dividing the bed of the ocean into two basins, one of which occupies the whole of the western portion of the North Atlantic, whilst the other extends the whole length of the ocean on its eastern side; and that the cold water in the western portion of the South Atlantic is due to there being no obstruction between the bed of this portion of the ocean and the bed of the Antarctic basin; in fact that this is a kind of tongue of the Antarctic basin. For example, if the direction of the imaginary line from French Guiana to the Azores, and from thence northward, be followed on a chart showing the soundings obtained in the Atlantic, it will be seen that close to this line, and along its whole extent, there are a series of soundings of less than 2000 fathoms; these soundings are not sufficiently numerous to prove by themselves alone the continuity of the ridge of less than 2000 fathoms in depth, but, taken in conjunction with the bottom temperatures, they may be considered as being sufficient evidence."

"Between Ireland and the south point of Greenland are a series of soundings of less than 2000 fathoms; and the ridge stretching north from the Azores meets the other ridge between Iceland and Cape Farewell, and so incloses a deep basin in the western part of the North Atlantic, the water in which is cut off from the cold stream at the bottom of the tongue of the Antarctic basin. This ridge is called the *Dolphin Ridge*."

"Between Tristan da Cunha and Ascension is a ridge of less than 2000 fathoms (now called the *Challenger Ridge*), which extends the whole distance between those islands; and from one or two other soundings obtained north of Ascension by the 'Hydra' and German frigate 'Gazelle,' this ridge may be extended in a N.N.E. direction from Ascension to a position in about 2° S. and 10° W. Between this position and St. Paul's rocks various soundings have been taken, nearly all of them under 2000 fathoms."

"Westward of St. Paul's rocks towards the Dolphin Ridge there are no soundings, but it is probable that the ridge continues in a W.N.W. direction, as north of this line the bottom temperatures are 2½° warmer than they are south of it. This is called the *Connecting Ridge*.

"From Tristan da Cunha there also appears to be a ridge running irregularly to the north-eastward, to the African coast. Only two soundings have been obtained on it, one by the 'Hydra,' of 1800 fathoms, and the other by the 'Gazelle,' of 1950 fathoms. But as all the temperatures south of the ridge are more than a degree colder than those north of it, we may conclude that it is continuous between the two places."

"This view of the division of the Atlantic into basins is also confirmed by the serial temperature soundings; for if the mean of the temperatures obtained at depths below 1000 fathoms be taken, either in the North or in the South Atlantic, the curve of these mean temperatures will be very nearly a straight line, which, if produced, gives as the least depth at which the mean bottom temperature of the Atlantic basins should be found, and, consequently, the greatest depth of the ridges separating those basins from each other, and from the tongue of the Antarctic basin. The following table shows the mean temperature, &c., of the South Atlantic at depths exceeding 1000 fathoms:—

Depth in fathoms.	Number of Temperature obtained.	Maximum Temperature obtained.	Minimum Temperature obtained.	Mean Temperature
		°	°	°
1,100	18	38·5	35·0	36·64
1,200	17	38·2	35·0	36·52
1,300	19	38·0	34·8	36·26
1,400	16	37·6	34·5	36·16
1,500	19	37·3	34·2	35·94

"The same process applied to the temperatures of the North Atlantic gives nearly similar results, as shown by the following table:"—

Depth in fathoms.	Number of Temperature obtained.	Maximum Temperature obtained.	Minimum Temperature obtained.	Mean Temperature
		°	°	°
1,100	40	39·1	36·6	37·72
1,200	40	38·4	36·4	37·34
1,300	37	37·8	36·2	37·03
1,400	35	37·3	35·7	36·70
1,500	36	37·0	35·5	36·46

"Both these curves would (if projected) cut the temperature of 35°·3 at the same depth, viz.: 1850 fathoms."

"As this is the mean bottom temperature of the eastern basin of the Atlantic, this appears to indicate that the ridge which separates this basin from the western basin of the North Atlantic as well as from the western part of the South Atlantic cannot exceed 1850 fathoms in depth, and that in this basin the temperatures from that depth are uniform to the bottom."

"The temperature line of 35°, or the mean bottom temperature of the Western Atlantic basin, is reached at the depth of 2000 fathoms by the mean temperature curve of the South Atlantic, and at 1950 fathoms by that of the North Atlantic. This shows that the ridge separating the Western North Atlantic basin from the South cannot exceed the depth of 2000 fathoms, and that from that depth to the bottom the temperatures in this basin are uniform."

"In both the longitudinal sections obtained in the North Atlantic the water on the western side is warmer in the surface layers, and colder in the bottom layers, than it is on the eastern side: the relative temperatures and depths in the sections from Bermuda to Madeira, and from Sombrero to Tenerife will be seen in the following table:"—

Temperature	Depth in Fathoms.			
	Bermuda.	Madeira.	Sombrero.	Tenerife.
°				
70	50	Surface.	90	Surface.
60	330	100	210	120
50	450	450	350	350
40	660	920	770	900

"This peculiarity was not observed either in the equatorial section or in that from the River Plate to the Cape of Good Hope. In the first named the isotherms are all rather deeper in the central part than they are at the extremes, whilst in the last all the isotherms are, if anything, rather deeper on the western than on the eastern side, but they are nearly at equal depths throughout."

"In the meridional section, from Tristan da Cunha to Madeira, the isotherm of 40° was nearest the surface in latitude 21° S., at a depth of 360 fathoms, from thence it descends steadily to 970 fathoms on the north side in latitude 25° 45′ N., and to 500 fathoms on the south side in latitude 32° S. On the polar side of these two parallels, it again rises. . . . . The isotherm of 50 was found at its minimum depth (140 fathoms) on two occasions in latitude 6° S. and 12° N.; between these parallels it descended irregularly to 190 fathoms in 8° N., on the polar sides it also descended to 410 fathoms at Madeira and to 270 in latitude 24° S.; south of this latter position it again rose. . . . . The isotherm of 60° (and all above it) was found closest to the surface in the parallels of 2° 30′ S. and 12° N. On these parallels all the isotherms higher than 60° are confined to depths under 30 fathoms; between them they open out slightly, and occupy a space of 70 fathoms; on the polar sides they also open out, occupying a space of 140 fathoms in latitudes 22° N. and 24° S., after which they again near the surface."

"A close examination of the various sections shows that between the parallels of 40° N. and 40° S. there is a much larger amount of warm water in the North than in the South Atlantic; that the water on the western side of the North Atlantic is warmer above the depth of 450 fathoms than it is on the eastern side, excepting where the Labrador current forces this warm water away from the American coast; that below the depth of 450 fathoms it is coldest on the western side; that in the equatorial regions the isotherm of 60° (and all above it) is much nearer the surface than in any other portion of this area, but that the isotherms below 60° are not similarly affected, more especially the isotherm of 40°, which is as great a depth in the vicinity of the Equator as in any part of the South Atlantic."

These features are thus accounted for: "The power of the sun in directly heating the water below the surface appears to be, even in tropical regions, extremely limited, for we found in latitude 3° 8′ N., longitude 14° 49′ W., the same temperature at 100 fathoms, in April 1876, as we had previously found in August 1873, although the temperature on the surface differed 6°."

"Similar results were obtained in the Mediterranean by Dr. Carpenter in 1870. He found that no matter what the surface temperature was, the temperature at 100 fathoms was always the same as that at the bottom, and the heat given to the surface water decreases as the higher latitudes are reached, until a position is attained where the temperature is that of the freezing point of salt water. As salt water at its temperature of congelation is denser than at any higher temperature, it would naturally sink just before it congeals, and would in time (did no other cause intervene) occupy the whole of the space in the ocean not influenced by the sun's heat. That is, that the whole volume of the ocean, excepting a wedge of the maximum depth of 100 fathoms, would be at about the temperature of the freezing point of salt water. But in considering the effect of the heat imparted to the surface we have also to consider the effect of evaporation and precipitation. Where the heat is greatest, there evaporation takes place quickest, and consequently, although the surface water may be warmer, yet, by reason of its increased salinity, it may be also denser than the water beneath, so that it would sink and impart its heat to the subjacent layers. But the water evaporated is also precipitated, not necessarily in those parts from which it has been evaporated, consequently the salinity and denseness of the surface water depends on at least three factors: its temperature, the amount evaporated, and the amount of rain precipitated. Where the amount evaporated greatly exceeds the amount precipitated, there the surface film, constantly descending, imparts its heat to the water beneath; but where the precipitation is nearly equal to or exceeds the evaporation, there we might expect the warm water to remain on the surface, and the isotherms to occupy but a small space in depth."

"In the equatorial regions it appears that, although the evaporation is very great, still the precipitation is also, as a rule, more than in any other part of the world; so that, although it may not be equal to the amount evaporated, it is still sufficient, in conjunction with the temperature, to prevent the surface film becoming denser than that below, so that the heated water remains on the surface. Were this water to remain in the same position, an excess of evaporation over precipitation would doubtless in time render its salinity sufficient to cause it to sink; but this surface water is, from the friction of the trade winds, aided by the earth's motion, constantly being propelled to the westward, and, meeting with an obstructing point of the South American continent, is deviated to the northward, so that the greater part of this heated surface film is forced into the North Atlantic with sufficient violence to cause a rapid current to issue from the Strait of Florida, which current is familiarly known by the name of the Gulf Stream; and the impetus thus given to these equatorially heated waters appears to be not only sufficient to supply that stream, but to cause a slower movement to the north-westward outside the islands of the Caribbean Sea, which water eventually joins the southern side of the rapidly moving Gulf Stream."

"If we take the width, depth, and rapidity of the Gulf Stream as being on an average equal to what the 'Challenger' found it when she crossed, on which occasion it was 100 fathoms deep, and running at the rate of 3 miles an hour for a width of 15 miles, this would show that it was discharging a volume of heated water of 4½ cubic miles per hour, or 108 cubic miles per day, into the North Atlantic."

"The salinity of this heated water, as well as that of the water moving to the north-westward outside the Caribbean Sea, is greater than that of the water beneath, so that although, from its temperature, it is lighter than the subjacent layers, yet on becoming cooled from contact with the colder air the density of this water increases until a temperature is reached at which its weight is sufficient to cause it to sink; as this heated layer sinks, it carries down its temperature, which is imparted to the subjacent layers. If the rainfall was sufficient to decrease the salinity of the water as its density was decreased by loss of heat, then, of course, no descent would take place; but the rainfall of the temperate regions, into which this heated water is discharged, appears to be by no means sufficient to accomplish this; and although, no doubt, some effect might be traced on the salinity, it is very slight, so that the immense quantity of warm water constantly being discharged into the North Atlantic, and as constantly sinking as it becomes cooled, appears to be sufficient to increase the temperature and density of the whole column of water in the temperate zone of that ocean, consequently the isothermal lines are found there at greater depths than elsewhere."

"That the column of water in the temperate regions of the North Atlantic is heavier than in any other part appears to be not only proved by the determination of specific gravity made on board by Mr. Buchanan, but also from the fact that its weight is sufficient to cause an outflow at the bottom of the Atlantic basins on all sides, as we find in the western part of the South Atlantic, where undoubtedly Antarctic water flows at the bottom as far north as the Equator; that the cold stream is almost entirely confined to depths greater than 1900 fathoms or, in fact, to depths greater than that of the ridges separating the basins of the Atlantic from each other, and from the Antarctic basin; and that at and above this depth of 1900 fathoms the temperature is 35°, or nearly the same as that of the Atlantic basins."

We have, for the purpose of brevity, taken some liberties with the original paragraphs, but trust we have conveyed the general idea so ably sketched out by the author on this important subject; and although, as before remarked, the conclusions drawn may not be received by some, it will doubtless raise a question that will greatly advance our knowledge of the physical condition of the deep sea.

J. E. Davis.

THE AGE OF THIS EARTH.

An able article in the *Quarterly Review* for July 1876 gives the calculations of several sciences, differing from one another by tens and hundreds of millions of years, on the age of our cosmical system.

Physical Geography was not represented; we claim for it, not only as great a knowledge of facts in reference to the main point as any other science possesses, but the means of enabling us to point out, where sciences seem to be in error as to time, to data, and consequently in their complex calculations.

Mathematicians are so correct in their figures, that when they start from one point to reach one end, their ends ought to be the same; when these ends vary, and we find no fault in the calculation, we must look into the data for the cause of variation and error.

The article alluded to gives us an outline of cosmical beginnings from the theory of Laplace, published in "1796" (Maunder). Astronomers had been aware that many nebulæ floated in space; these became "specimens of worlds in making," under the powerful telescope of the French astronomer. As the nebulæ became denser, they came under "the action of gravity," consequently "a succession of rings, concentric with and revolving round the centre of gravity," were formed. "Each ring would break up into masses, which would be endued with notions of rotation, and would in consequence assume a spheroidal form. These masses formed the planets, and gathering with energy round its centre formed the sun." It is then explained, "that the earth could not have had an independent existence till long after that time . . . . for before then the earth must have formed part of the fiery mass of the sun." The *Quarterly* observing: "Thus probably was the world we live in, and the solar system of which we form a part, evolved out of chaos."

Science has proved that motion causes heat, and therefore the sun was provided with a supply by the action of the nebulæ. If they were cold when they came together, the only condition they could have been in, the supply of heat was calculated to last for 20,250,000 years at the present rate of consumption. Thus "the dynamical theory of the sun's heat renders it almost impossible that the earth's surface has been illuminated by the sun's rays many times ten millions of years; and when we consider underground temperature, we find ourselves driven to the conclusion that the existing state of things on earth, life on the earth, and all geological history showing continuity of life, must be limited within some such period of time as 100,000,000 years." This authority, Sir William Thomson, is reported to have told the British Association at Glasgow, that "50,000,000 years is an even estimate" for the age of this earth (*The Mail*, 8th of September, 1876).

A comfortable margin of 50 per cent. seems convenient to the precise sciences. Professor Tait is reported to have said in a late lecture at Glasgow, in alluding to differences on this subject, "so much the worse for geology as at present understood by its chief authorities, for physical considerations render it impossible that more than 10,000,000 or 15,000,000 of years can be granted." Before entering on physical details it will be as well to point out a curious position between mathematicians and geologists in reference to "underground temperature." Some geologists assign all igneous action on this earth to local chemical causes; but the fashionable school allows its ignorance on this subject in the *Text-book of Geology* by Mr. Page, seventh edition, p. 51: "The occurrence of volcanoes, earthquakes, escapes of heated vapours, and thermal springs, are by far too numerous and general to be accounted for on any principle of chemical union with which we are acquainted." In other words, the expenditure of heat from the earth is supposed to be more than local chemical causes could supply. Mathematicians give "20,250,000" years of heat to the sun; as this earth is supposed to have been an offshoot from its "fiery mass," we may infer, that when the earth was detached, it must have been in the same hot condition as the parent mass. Mr. Proctor gives us the diameter of the sun at 850,000 miles, and Guyot's geography gives the diameter of this earth at 8000 miles. If, then, the diameter of the sun contains heat for 20,250,000 years, the diameter of this earth can only hold heat for 190,588 years. We know nothing of fresh supplies of fuel to earth or sun, in reference to the theory of Laplace; we give the sun the credit for greater expenditure of heat than the earth; but if geologists are right in supposing that local chemical causes have been unequal to earth's expenditure, and that this has been going on for 10, 12, 50 or 100 millions of years, according to the calculations of physical science, we may wonder why the internal fire did not become bankrupt long ago. We may also remark, in passing, that if igneous action is of any advantage to this earth, it is lucky that neither science had any hand in its origin.

It was pointed out by the German metaphysician Kant, and has been accepted by others, that there has been a retardation of the earth's revolution from the tidal wave. The conclusion, as given in the *Quarterly*, is "she was rotating at about the same rapidity as now, when she became solid, and as the rate of rotation is certainly diminishing, the epoch of consolidation cannot be more than 10 or 12 millions of years." This calculation cannot be of much consequence to the cosmical system; but as no one knows how the tidal wave acted, before there was land for it to flow and ebb upon, we put the theory down as useless, and accept the tidal action as a part of the dynamical action, that helps to keep the whole sphere in equilibrium.

We now come to a mixture of mathematics and geology. The late Sir Charles Lyell, calculating from the present growth of the dry land, put the age of this earth at 300,000,000 of years, the fossiliferous strata at 240,000,000, and the glacial epoch at 1,000,000 years ago.

The earnest and accurate mathematician Croll endeavours to modify the geological epochs by a calculation "at once beneficial, simple and complete. . . . . The land has been many times under the sea, and the most violent changes of climate have succeeded one another." Causes are produced to show "that every 10,000 years or thereabouts the winter of the northern hemisphere will occur, ... whenever any records are left of the glacial epoch, a general subsidence of the land followed closely on the appearance of the ice, ... the extent of submergence will be in proportion to the weight of ice, ... glaciation would be transferred from one hemisphere to another every 10,000 years. There would be elevation of the land during the warm period, and subsidence during the cold."

The article goes on to tell us, that "the discovery of Mr. Croll upsets the whole scale of geological time." Croll gives four periods of glaciation, the last of which was 200,000 years ago; so that the glacial period is reduced to that age—the date of the fossiliferous rocks to 48,000,000, and the age of the earth to 60,000,000 of years.

All glacial epochs are supposed to have left their marks behind them. Croll says they occur every 10,000 years; but the writer of the article has left out twenty of these periods, and selected one of Mr. Croll's without knowing whether Sir Charles Lyell referred to that particular period or to another, which Croll tells us took place 850,000 years ago. As figures go in this matter, Sir Charles would have a very small margin of 150,000 years, if he worked on the traces of this period. The writer of the article seems to have had an object in his figures, by reducing them as nearly as possible to his own.

We must now consider two more facts brought forward by Croll in support of his calculations.

First: "The land has been many times under the sea." . . . . "The submergence will be in proportion to the weight of ice." The latter quotation cannot be proved, ice vanishes, and its weight cannot be known. Submergence of land takes place all round the world. The causes are soft foundations and growing superstructures, pressures, sinkings below water, sedimental gatherings, gradual risings, and the repetition of the same actions till a solid foundation is secured. When foundations are undermined by subterranean water-action, submergences of surface areas occur suddenly, and the rising again is uncertain.

Second: "Violent changes of climate have succeeded one another." Opinions vary as to the cause of this in the Arctic regions. Some follow Mr. Croll in his see-saw theory, or the oscillation of the Poles. If it takes place, changes of climate must ensue; but a very material point seems to have been forgotten—if the oscillation is cosmical, the water would go down with the land; there would be no submergence. There would be 10,000 years of ice, and 10,000 years of warmer climate. These changes would be general, but the fossils of warmer regions do not prove a general growth, neither do the warm region drifts of the present prove a general action through the Arctic regions. In the late Arctic expedition it was colder on one shore of Smith Sound than on the other, and Captain Sir George Nares gave his experience of the Arctic and Atlantic Oceans to the Royal Geographical Society.

In the Atlantic Ocean there is "an enormous reservoir of heat." This warm water is forced "gradually towards the northward and eastward, modifying the climate of all parts lying in its course. There is also a warm current ever running to the northward through Behring's Straits." These warm supplies run at present through certain channels, while in other channels "an icy cold current" runs to the southward. The Polar basin has a "warm stream of water constantly pouring into it between Spitzbergen and Norway, and a cold icy one as constantly running out between Spitzbergen and Greenland, also . . . . between Greenland and America; . . . . so great is the difference of climate caused by these powerful distributors of heat and cold, that the temperature of the sea . . . . 2200 miles from the Equator is precisely the same as that nearly double the distance from the Equator."

As we have these cosmical actions, guided by fixed cosmical laws, perpetually circulating the heat and the cold—not always in the same channels, but distributing both according to the direction of either current—we find a certain cause for the "violent changes of climate" alluded to, instead of the more than uncertain oscillation, with the doubtful results of Mr. Croll. We cannot agree with the author of the article in the *Quarterly*, or allow that this glacial theory in any way interferes with geological time, as laid down by the late Sir Charles Lyell. Having thus disposed of certain details as to the age of this earth, we must now briefly consider the position of our geological science on this point.

Properly speaking, geology is a discourse of things on or in the earth, of things tangible and visible. In accepting the theory of Laplace, the foundation of their science is neither tangible nor visible. It suited geology to adopt it, because, in the prevailing ignorance of natural laws, it seemed to explain the causes of certain phenomena. Now that a more accurate knowledge of cosmical law is creeping up, there is no excuse for adhering longer to a theory which is incapable of explaining the cause of igneous phenomena on or in the earth, while it is made ridiculous by the little figures of the mathematicians.

We cannot meet the dogmas of science on this subject, because we think with a finite mind in an infinite beginning; but we ask geologists and mathematicians to follow us through a brief tracing of the cosmical laws and their actions from that beginning, as far as that has been revealed to us till now.

There was a void chaos of waters without form, and dark; how long this earth remained in this condition we do not know. A water-bed was formed, light was given, motion, day and night ensued, revolution on its axis had commenced and continued to this sphere its hours of labour and of rest. Another result followed the presence of light—water was attracted by it, as it is to day; the water-clouds were collected in the firmament, and were divided from the waters under the firmament; all this law is in force now, but no one can say how long a time elapsed before the action became perfect and complete.

As the light caused a movement in the waters, so the waters acted on their bed. No one can say where the general level of that early bed was. But as it deepened from the ever-acting erosion of the waters they were of necessity gathered unto one place, and the bed which they had rested on became dry land.

No science can tell when this happened; we do not know where the first water-level was, the level of the dry land, or its locality; no one knows when light first shone upon earth, or when it first divided the waters; we cannot say how long the atmosphere and the water were occupied in forming the silicious nucleus of our earth, but we know that it gives silicious matter now. We cannot tell when the water was separated from the atmosphere, or how long the atmosphere retained in itself the elemental constituents of water and of earth. The mathematician and geologist have nothing to do with the subject before this event took place: there is nothing visible or tangible, no data for a single figure. The moment dry land is created the physical geographer begins his labours. They are not difficult; he knows the uncertain forces that work under cosmical laws on for-ever-changing materials; by knowing the results at present, he can tell those of the past. Far be it from us to suggest infallible action; we can but give a faint outline of the whole, but we give nothing that cannot be verified by the law and its actions at the present moment.

The geographer looks through time upon the face of the first dry land; he sees the watersheds giving out their little trickles, all running down the slopes, all wearing away something in their course, all depositing some atoms on their way, and all carrying on to their little estuaries or deltas a constant succession of minute atoms. He sees the deltas constantly extending by the addition of atoms, and constantly rising in consequence of the retiring of the waters. He sees constant additions to the dry land made by the water in one place, and constant abstractions in another; he knows that every atom taken from the water-bed makes that bed deeper, and every atom taken from dry land helps eventually to extend its shores.

Under these actions he comprehends that the dry land must have gone on growing, and that the undulating ocean-bed must have grown deeper where its currents ran, and shallower where they did not; he traces the gradual growth of these shallow places, not by any forcible elevation of the mass, but by the slow departure of the water, by the sediments left upon them, by the eventual growth of vegetation, by the creation of life, by the elemental forces for ever returning to their dusts, in some regions or another, to the extending deltas, and the growing dry land.

He looks upon the mud and sand-banks of to-day, and sees the same forces at work under the same laws; he knows that these forces acted under the same laws at the beginning, and he knows that they acted on the materials then available as they act on the materials of to-day. He marks through legends, history, and his own experience, the denudations and the additions of the sea-shores; he finds that in thousands of years the general contour of the dry land has remained the same; he finds localities have been added to and taken away. In these subtractions he sees the fossil remains of prehistoric organic structure torn from their resting-places in the calcareous rocks, he handles the flint nodule formed from the silicious dusts of diatoms and foraminiferæ, and finds the same dusts in course of deposit in the deepest parts of the ocean, telling him not only that these organisms have continued their races for millions of years, but that they have, for all those ages, left their dusts to subside upon the ocean-bed, certain evidence that the site on which we find the stratified calcareous rocks, with their lines of flint nodules, was once the ocean-bed. He may look on the sand collections now on our surf-beaten shores, on the wind-drifts of the great deserts, and on the sand-dunes in many regions; he does not know when they began to grow, but he sees on mountain-sides sandstone rocks several hundred feet in thickness, many miles in length and breadth. He knows that they were formed and gathered by the same forces that now occupy hundreds of years in adding a few inches to the shores, and he is lost in thinking of the vast amount of silicious matter broken up, triturated into sand, and deposited by the water on its bed, and that bed hundreds of feet above his head. He finds the hard silicious rock in stratified form on the tops of our highest mountains, in their interior, and in the deepest seas, where it still wears away, and contributes atoms for deposit in other places. He is lost in the time occupied by the deepening of the sea, by the vastness of the deposits formed by it, far above its present surface-level, and by the extent of deposit now in progress in its depths. The geographer knows that every river is always bringing something to its estuary, yet its growth of dry land is very slow; he measures it, but he cannot tell by that measurement when the estuary of the Nile was 4000 miles from its present site. He may trace the Mississippi from its present watery delta back to its tributaries in the Rocky Mountains, but it does not tell him when these, now great, waters trickled as little rills from the first dry land of those regions. He looks upon the water-worn chasms of the Himalayas and the Alps, on the vast gorges of great rivers, he cannot say when those rivers began to run, or how long it took them to wear away the hard obstruction to their course, any easier than Sir Charles Lyell could tell the age of the Niagara Gorge.

He may see the vast structure of the coral insect now growing over thousands of miles in the Red Sea, but he does not know when those structures were commenced. He sees the stupendous mass of the Dolomite Mountains, he knows that these were all lodged as sedimental matter, where they now stand, by the same water-forces which had previously built up the silicious Alps; that all the materials of which they are formed were brought atom by atom, just as atoms are lodged on our sea-coasts to day, by the waters, which were then deeper than the mountains are high, from places on the sea-bed which were shallower, places that were washed away, and deepened by the very force that broke up the coral-banks, carried them away, and lodged them where they are. He can form no idea where or when the insects lived that gathered all this calcareous matter from their water, how long it occupied them in constructing their palaces, how long they existed, when they were pulled to pieces, how long they were triturated by current and by wave, or when the atoms were permitted to become deposits.

He may look on the calcareous matter of the Jura Mountains, and know that they are formed from bones and shells of fauna that once lived on land or in the water; he knows that these masses were lodged in water as deep as the mountains are high, in minute fragments, with an occasional entire shell or an unbroken bone, but he knows nothing of the land or water in or on which the fauna lived. He cannot count the time occupied in the formation of these mountains, or tell for how many ages the fauna lived that left their dusts to form them. Wherever the physical geographer turns, he is lost in the lapse of ages. The waters have left their old beds, the land has acquired new dimensions. All dry lands have their high places, from which their watersheds convey their atoms away; every atom helps to extend dry land, the watersheds are the agents for the work, and the great waters are the agents for the separation of matter, and for its deposit in its proper place. All this is done now under certain laws by their cosmical agents, air and water.

No one knows better than the physical geographer the truth of the words used by the writer in the *Quarterly Review*: "In all the operations of nature . . . . God worked by law . . . . by the process of slow development, by means beautifully simple, involving no violence, no haste, yet irresistible." No one sees more clearly the error, ascribed to Professor P. G. Tait, in *The Mail*, 8th January, 1877—"the present state of things has not been evolved through infinite past time by the agency of laws now at work, but must have had a distinct beginning." "When was it, and what was it?"

It is the slow, the certain, the beautiful, and the unchanging process of cosmical law, which gives the character of infinite to the universe. Finite man has not as yet read the pages of the law, and cannot therefore calculate the age of this earth. He has tried over and over again to do so, but Professor Tait is not so near to the truth as Solomon was; other "guesses" (*Quarterly*) may be nearer, but the men who guess are at present without chart, compass, or sounding line on the fathomless and boundless ocean of eternity.

H. P. Malet.

Reviews.

——:o:——

THE CRUISE OF THE 'CHALLENGER.'*

We have, in the preceding pages of this journal, given an outline of the proceedings of H.M.S. 'Challenger' in her voyage round the world principally for the purpose of submarine explorations. This expedition, from a scientific point of view, has been considered one of the most important and interesting that ever left our shores, and whether we consider the wide range of investigation which was submitted to the explorers by the Committee of the Royal Society, or the scope it furnished to add to our knowledge of the great depths of the ocean (with a due consideration to the comparatively brief time alloted for such an undertaking), it may be affirmed that the results are eminently successful, although we have not yet had the official account of them

We know that Sir Wyville Thomson has an important work in the press on the purely scientific results of the voyage; and we may hope that, now Sir George Nares has returned from the Arctic regions, we may have a narrative of the proceedings of the expedition, which for the greatest portion of the time he so ably commanded. In the meantime we have before us two works by officers who served in the expedition, and although of varied merit as literary productions, they greatly help each other in bringing before us what was seen and done in the voyage, apart from the purely scientific proceedings and deductions. The first named, by Mr. Spry, who served in the 'Challenger' as an Engineer, is an account of the voyage and proceedings pure and simple, with just so much from personal observation as to suffice for a filling-in between the dates. In the last, by Lord George Campbell, a Sub-Lieutenant of the ship, the author has avoided the technical account of the voyage, excepting in his concluding chapter, and struck out entirely from the routine of the ship to give us an account of all he personally did, saw and thought; but the two books in conjunction furnish us with a very good account of the voyage, although in point of fact they could well exchange titles, the first being far more "Log Letters" and the last "Scenes in many Lands."

---

* *The Cruise of H.M.S. 'Challenger;' Voyages in many Seas, Scenes in many Lands.* By W. J. J. Spry, R.N. Sampson Low, Marston, Searle and Rivington, 1876.

Log Letters from the 'Challenger,' by Lord George Campbell. Macmillan and Co., 1876.

We cannot but notice that Mr. Spry is occasionally indebted to our own columns, the extracts from which are unacknowledged; but we think he would have done well to have studied them a little more, as he would have rendered his description of the *sounding rods*, in pages 44 and 45, more perfect, as he also would have done the drawings, had he taken them from the instruments themselves; nor would he have found in our pages that we attributed the invention of one of the sounding rods to "Commander Bailey, R.N.," but to Navigating-Lieutenant Baillie. It is difficult in Mr. Spry's book to find a passage with which we are not familiar from the accounts already published, but we extract one that we do not remember to have seen, of Japan:

"I paid a visit to numerous temples, and in describing the one of Asakusa, which is situated in one of the most populous quarters of the city (Yedo), I shall convey an idea of the whole. This is one of the largest and most celebrated in Tokio. On reaching the locality, we pass on through long avenues crowded with men, women and children. Here, on either hand, are stalls filled with nicknacks of all descriptions, with refreshments, and troughs containing sacred water, with numberless sacred towels flying like so many flags. As we approach the Holy of Holies, a large bronze figure of Buddha is in view, and we pass on to the building, gorgeously decorated in gold and lacquer work, with elaborate and ornamental carved roofs and pillars. The sacred shrine to which the multitude come to pray is protected by a large frame of wire-netting. A curious practice seems in force with the hundreds who pay their devotions here; they purchase from the priest in attendance small squares of paper, on which are inscribed certain hieroglyphics; these they chew for a time and then throw as pellets at the grating (which is consequently covered with the results). And the precision with which these pellets strike the grating or go through the mesh, determines certain inferences as to good or bad luck."

There are some well-executed wood-cuts in Mr. Spry's book.

With the Log-leaves it is difficult to select a passage that is not new and interesting, even though it may be a subject on which others have previously written, and we could scarcely give a better specimen of the style in which it is written than from the first paragraph in it:

"At length we are ready, the last packing-case of science on board, the last good-bye said, the last hawser cast off, a tug tows our bows round, 'Full speed ahead!' and hurrah! we are off on our cruise round the world. We steam out of Portsmouth harbour, through the 'Needles,' and down Channel with a smooth sea and a light head-wind, not long to last though, for in two days' time we got a heavy gale, which shook us all nicely down into our places; close-reefed topsails—ship rolling like mad—sleep at a minimum—scientifics sick—stand-up breakfast—coffee down our boots instead of down our throats—crockery smashing—perfect misery—attempted joviality, &c. And so with a persistent foul wind, blowing sometimes very hard, and sometimes lighter again, and until the last day or two a heavy, confused sea and swell, we jogged uncomfortably on, now beating about under sail, and now steaming head to wind, until the 3rd of January, when we arrived at Lisbon."

Thus of the proceedings. Here is a description in Humboldt Bay, New Guinea:

"But I have lots of things yet to tell you about the savages. As I said before, they are absolutely naked, their colour a dirty sooty-brown, quite unhandsome; and a skin disease, common among these islanders, is common here too, and has the effect as if white pepper or dust had been sprinkled over them. They are not got up in the toggery I have described; many are not painted at all, and have no shrubbery about them. The boys and young fellows shave their heads clean, excepting a narrow 'fore and aft' ridge on the top of the head. Their noses are not pierced either, and many of them have quite pleasant faces. Clean-looking, well-built young fellows these, with grinning white teeth, a pleasant feature which they afterwards spoil, as they do all their features—their nose by a great hole, their teeth by chewing betel-nut, and their faces by hideously painting them. Their shoulders are marked with great lumps, in lines and curves, which they produce by intentional gashes. The bows are about six feet long, a few neatly grafted over with plaited fibre, slightly carved, and strung with a strip of bamboo. The arrows are also made of bamboo, unfeathered, tipped with fire-hardened wood, cut into a series of sharp barbs and ugly notches; the whole tip being more than a foot long. Fancy having that stuck into one! . . . . These arrows are about five and a-half feet long. Their daggers are made from the leg-bones of cassowaries, a piece from which is sliced off, the rest ground into a sharp point."

At Valparaiso the author left the ship and crossed the Andes; here is the view from the highest pass:

"And now we are at the top of the pass—the Cumbre; 12,656 feet above the sea, and 5 miles from the Yunequal rancho. The scenery was of course magnificent, but still disappointingly magnificent to me. Behind us lay a chaotic heap of mountains, the lower ones coloured all shades of light and dark ochres, or dusty grays, the ravines between them lying in shadow, while the higher blocks, some close to us, some far away, were coloured purple, veined, or capped with snow. In front and far below us lay a valley, with level river-threaded bed making away to the left, its course, to our right being hidden by a shoulder of the ridge on which we stand, bounded by sterile yellow and red-coloured mountain ridges, which immediately in front of us rose in a great black mass, through which in the face of the precipice ran a broad band of white (quartz?) rock."

We are much tempted to add other extracts, but want of space forbids; we will, however, add a short statement, as it may help to throw some light on the much-vexed question of the cause of scurvy in the Arctic Expedition:

"At the bottom of this, D. and his surveying party were once imprisoned for three months by walls of snow, which blocked the valley to such a height that scaling the mountain flanks was impossible; but at last, when only a small sack of beans was left, D., weak with scurvy, managed to crawl round the snow-wall, and so got intelligence of their plight conveyed to Mendoça, whence pack-mules with provisions were sent, just rescuing the party in time, for all were down with scurvy, and one man was as nearly gone as possible."

To those who are aware of the nature of the 'Challenger' voyage, and fear in Lord George's book a scientific manual, we can assure them that they will be agreeably disappointed, for a more interesting and amusing book of travel we have not perused for some time.

Quarterly Review, January 1876. Art. V., p. 146. Geographical and Scientific Results of the Arctic Expedition. (Murray.)

We welcome this article in the *Quarterly Review* as an expression of the matured opinion of the vast majority of our countrymen. "Though our explorers did not reach the Pole," says the Quarterly Reviewer, "they achieved many of the scientific results that those most able to judge think possible or necessary, and, what is far better, have exhibited to the world a model of quiet heroism under privations the extreme nature of which are by no means as yet generally known. Like noble fellows as they are, they would not have hesitated to remain, if any good purpose could be served by doing so." Speaking of the journey of Captain Markham, the reviewer says—"He did all that mortal man could do, and, to say the truth, all that he was meant to do, in planting the British flag in the highest latitude ever reached by man. The heroism of the sledge-crews was magnificent. Overworked, overtired, borne down by the weight of a dreadful and depressing malady, cold, hungry, they struggled on. It was not till they were utterly exhausted that they turned their faces towards the ships. Surely nothing finer was ever recorded than this advance of three sledges, one to the north, another to the east, a third to the west, laden down with sick and dying men, in obedience to an order to do their best, each in their separate direction. And nothing more touching was ever penned than the narratives, full of tenderness and simplicity, in which the sailor-writers tell their story. There are some defeats which are more glorious than victories; some failures which are grander than the most brilliant success. These gallant seamen have failed to reach the Pole, but they have won a proud place in their country's annals."

The review contains a most interesting *résumé* of the important results to be obtained from Arctic exploration, which will, we have no doubt, have an important effect in proving to the public that further research is desirable; yet, with strange inconsistency, the reviewer himself seems inclined to advise that we should "rest on our oars."

———:o:———

Boletin de la Sociedad Geográfica de Madrid, No. 1. Madrid, 1876. London (Trübner & Co.).

We have received the first number of the *Boletín* of the Geographical Society of Madrid, founded on the 2nd of February, 1876, by Senhores D. Francisco Coello, D. E. Saavedra and D. Joaquin Maldonado Macanaz, and numbering already more than 600 members. The first number of the *Boletín* contains an account of the preliminary meetings at which the Society was constituted. The *Boletín* is to be a monthly publication, but there will likewise be a *Coleccion Geográfica,* to be published at irregular intervals, as materials accumulate. The Committee of the Society has not only laid down rules for spelling geographical names, but has actually adopted a new initial meridian, which is to pass through the Punta de la Orchilla on the Island of Ferro, long. 20° 30′ W. of Paris, or 18° 9′ 46″ W. of Greenwich. Surely it would have been better to accept the meridian of Greenwich or of Paris pure and simple, or to adhere to the conventional meridian of Ferro, which is merely a meridian of Paris in disguise, drawn 20° to the west of Paris. As to the rules for transcribing foreign names, they are perhaps a trifle more complicated than they need have been, and several of the diacritical signs might certainly have been dispensed with, but we hope they will be strictly adhered to until some better system meets with universal acceptance in the geographical world.

An Essay on New South Wales, the mother colony of the Australias. By *G. H. Reid.* Sydney, 1876. London (Trübner & Co.).

The International Exhibition at Philadelphia has been the cause of the publication of several valuable statistical and geographical memoirs on different countries. We recently had occasion to notice the monograph issued by the Government of the Empire of Brazil; and we now have before us an equally exhaustive work brought out under the auspices of the Government of New South Wales. Mr. Reid, to whom the compilation was entrusted, has succeeded in compressing a very large amount of useful information into a comparatively small compass, and we have pleasure in recommending this essay as a valuable handbook. It treats first of the boundaries, physical aspects, and population, which are the bases of all statistics, and then proceeds to furnish well-arranged details respecting the political arrangements, finance, communications, land tenures, agriculture, mines and manufactures, commerce and shipping, moral and intellectual condition, and defences. We specially commend the system of arrangement, which coincides with that adopted in the Reports on the Moral and Material Progress of India for the years 1871-72 and 1872-73.

———:o:———

Drei Monate im Libanon. Von *Professor Oscar Fraas.* Stuttgart, 1876. London (Trübner & Co.). 8vo., pp. 108.

Professor Oscar Fraas visited the Libanon, in 1875, by invitation of Rustem Pasha, and for the purpose, more particularly, of examining into its geology. The little book now published presents us with a popular account of the Professor's journey and with a description of the Libanon district and its inhabitants. The first three sections have already made their appearance in a newspaper, whilst the fourth, general, section is based upon notes prepared for the purpose of lectures. The author has done well to republish these letters and lectures. They abound in interesting matter, and anthropologists more particularly will find much in them deserving their attention.

———:o:———

Revue Géographique, dirigée par *M. Ludovic Drapeyron.* Paris (Thorin). London (Trübner & Co.).

We have received the first number of a new French Geographical Review, which cannot fail to achieve a success, if the promises held out in the prospectus are realised, and the contributions continued of the same high standard as those contained in this specimen number. The list of French men of science who have promised to support this new venture is large, and it includes many names favourably known beyond the limits of France. We meet thus with the names of MM. Berlioux, Berthelot, Colonel Coello, Cortambert, Daubrée, Delisle, E. Desjardins, Joanne, Levasseur, Malte-Brun, Maunoir, Quatrefages, Elisée Reclus, E. Renan and others. The present number contains a paper on the influence of geography upon political economy, by M. L. Drapeyron; a statistical notice of Roumania and Servia, by M. Levasseur; a paper on the Brussels Congress, by M. Maunoir; and a number of miscellaneous articles. Amongst the papers promised for future numbers there are "Etudes sur l'Angleterre," by M. Thierry.

Erratum.—In [illegible]r number for December 1876, page 317, line 1, *for* + 30, [illegible] + 12.

Cartography.

The batch of maps recently received from India, though bearing evidence to the progress of publication, does not contain anything striking either on account of its novelty or of other features.

The Indian Atlas[*] has been increased by two quarter sheets published provisionally without the hills. Of Revenue Survey Maps we have received no less than twenty-eight sheets, of Topographical Maps ten sheets, and of maps published by the Superintendent of the Great Trigonometrical Survey seven sheets, being a total of forty-five sheets; all of them presenting us, for the first time, with the results of surveys recently terminated or still in progress. The Revenue Survey of Assam[†] is represented by fifteen sheets of the District of Goalpara, surveyed in 1867-69 and 1873-75, during the former years by Mr. J. H. O'Donel, during the latter by Major D. MacDonald. The Index Map which accompanies this survey is drawn on a scale of 4 miles to an inch; hills, altitudes, and boundaries are to be found upon it, and it admirably answers the purposes of a special map. One sheet has been added to the Map of Bhawulpore.[‡] It is from surveys made in 1869-74 by Captain H. C. B. Tanner and Mr. E. T. S. Johnson, and the level series have been inserted upon it in red. In the Central Provinces maps of the districts of Baitool and Bilaspur[§] have been completed, both surveyed in 1872-74; the former by Major R. E. Oakes, the latter by Mr. W. Lane. Both these maps are accompanied by skeleton index maps on a scale of 4 miles to the inch. We are also indebted to the Revenue Surveyors for large scale plans of four towns and cantonments. Captain G. Strahan supplies us with plans of Kishengarh, Ajmere, and Jhalra-Patan (with Gagron Fort)[‖], all of them surveyed between 1872 and 1875, whilst Colonels J. E. Gastrell and D. C. Vanrenen have prepared a plan of Moradabad,[¶] partly based upon surveys made as long ago as 1864, but revised in 1872.

The Topographical Surveys published refer to Chota Nagpore, the Central Provinces, and Khandeish. The map of the former[**] has been increased by two sheets, from surveys by Captain G. C. Depree, made in 1863-64. One sheet of the reduced map of the Central Provinces and Vizagapatam Agency Survey[††] has been published, embracing three sheets of the one-inch map, and based upon surveys made by Lieutenant T. H. Holdich in 1873-75. The Map of Khandeish and Bombay Native States[‡‡] is a new work, intended to replace Major Briggs' map, based upon a survey completed in 1822, and of which several revised editions have since been published. The seven sheets of the new map now issued are very well executed, but possess no feature calling for special remarks. They are from surveys made in 1873-75 by Messrs. H. Horst and F. B. Girdlestone.

Four sheets have been added to the Map of Kattywar which is being surveyed by a party of the Great Trigonometrical Survey of India, commanded by Captain A. Pullen.[*]

The last map to be noticed is one of Dehra Dun and the Siwaliks,[†] which is being prepared by Captain F. Bailey, of the Forest Department, and in connection with the Trigonometrical Survey. This map is executed with great care—cultivated lands, waste lands, and the boundaries of government forests are marked upon it.

Professor Archibald Geikie, Director of the Geological Survey of Scotland,[‡] has prepared a Geological Map of that country on a scale sufficiently large (about 10 m. to 1 in.) to present no less than thirty-six formations with a considerable amount of detail. In addition to his own surveys and traverses, extending into most parts of the country, the author has embodied into his work the labours of his predecessors and contemporaries. The resulting map is a work of sterling value, which ought to supplant all older maps of Scotland, which are incorrect not only as to details, but frequently also with respect to leading features. The geological data, we ought to mention, have been laid down upon a topographical groundwork carefully prepared by Mr. T. B. Johnston, which presents us with the results of the Admiralty and Ordnance Survey, as far as published.

E. G. Ravenstein.

Log Book.

The Committee to investigate the Causes of the Outbreak of Scurvy in the Arctic Expedition.—The Admiralty have appointed a committee, consisting of Admirals Sir James Hope, Sir Richard Collinson, and Inglefield, Dr. Donnet, R.N., and Dr. Fraser, to investigate and report upon the outbreak of scurvy. Sir James Hope has no Arctic experience, but, as chairman, he is an officer who is sure to do his work thoroughly and exhaustively, so far as the collection of evidence is concerned. Sir Richard Collinson was Captain of the 'Enterprise,' in which ship he passed three winters in the ice and had personal experience of sledge-travelling. Admiral Inglefield made three summer cruises to Baffin's Bay, but he has not wintered in the Arctic regions. Dr. Donnet was the surgeon of H.M.S. 'Assistance' in 1850-51, and is well acquainted with all phases of Arctic work. Dr. Fraser is a civilian. The labours of the committee are likely to extend over some weeks; as the examination of witnesses will not only comprise the officers of the late expedition, but also many who served in the searches for Sir John Franklin, including McClintock, Richards, and Hamilton; and Drs. Lyall, Toms, Scott and Ede. Some valuable information is sure to be elicited by this investigation, which will be serviceable in the organisation of the next Arctic Expedition. The sittings of the committee commenced on the 11th of January, and will probably be continued until the beginning of February. Among others Commander Cameron will be examined, as he and his people suffered from scurvy during the latter part of the memorable march across Africa.

---

[*] Indian Atlas, quarter sheets, 2 N.E. and 52 S.E. (no hills). Calcutta, 1876.

[†] District of Goalpara (Assam Revenue Survey), scale 1 m. = 1 in. Sheets 1 to 13 and 16. Index map of same, scale 4 m. = 1 in. Calcutta, 1876.

[‡] Punjab Revenue Survey: Bhawulpore State. Sheet 111.

[§] District of Baitool, seven sheets, scale 1 m. = 1 in. District of Bilaspur, nine sheets, scale 1 m. = 1 in. Index sheets to the above, scale 4 m. = 1 in.

[‖] Kishengarh City, Rajputana, two sheets, scale 12 in. = 1 m. City and environs of Ajmere in Rajputana, scale 12 in. = 1 m. City and cantonment of Jhalra-Patan and Gagron Fort, scale 6 in. = 1 m.

[¶] Moradabad, cantonment, town and environs, scale 6 in. = 1 m.

[**] Chota Nagpore, Topographical Survey, scale 2 m. = 1 in. Sheets 11 and 14.

[††] Central Provinces and Vizagapatam Agency Topographical Survey, 1 in. = 1 m. Sheets 51, 52, and 53 in *one*.

[‡‡] Khandeish and Bombay Native States Topographical Survey, scale 1 m. = 1 in. Sheets 4, 8, 9, 14, 15, 16, and 17.

[*] Kattywar Survey, scale 1 m. = 1 in. Sheets 31, 42, 43, and 44.

[†] Dehra Dun and the Siwaliks, scale 1 m. = 1 in. Sheets 4, 9, 19.

[‡] Geological Map of Scotland, by A. Geikie. Edinburgh and London (W. & A. K. Johnston).

Canalization of the Darien Isthmus.—The Colombian Government, on the 28th of May, 1876, granted a concession to M. Antoine de Gogorza, of the right to cut a canal through the Isthmus of Darien, in consequence of which the "Civil International Society of the Interoceanic Canal of Darien" was formed in Paris. At present about sixty shareholders have subscribed a fund for the despatch of an exploring commission, the members of which arrived at Panama last December. The President of directors of the Society or Company is General Turr, a Hungarian, who served under Garibaldi; and his colleagues are M. Cousin, a French engineer; M. Rampon, a naturalist who has been much in Colombia; M. de Reinach; and M. Lescanne Perdoux. These directors sent out the Exploring Commission, which is commanded by M. Lucien Napoleon Bonaparte Wyse, a commander in the French Navy, who, in 1868, ascended the River Bayano from the Pacific as far as the dividing range above the Gulf of San Miguel. His father was The Right Hon. Sir Thomas Wyse, H.M. Envoy in Greece, and his mother was Letitia, daughter of Lucien Bonaparte. The other members of the Commission are M. Celler, an engineer, who is in charge of the technical operations; Mr. W. A. Brooks who is to direct the work of boring and the geological researches; M. A. Reclus, a brother of the geographer and an officer in the French Navy, is the hydrographer; Captain Bixio, an Italian officer, is Secretary to the Commission; and fifteen other engineers and topographers complete the staff. The Commission was to leave Panama, in the steamer 'Toboguilla,' on the 11th of December, for the Bay of San Miguel, accompanied by Señor Aizpuru, the President of the State of Panama. Here their labours will commence.

The Census of Peru.—The Minister of Public Works, at Lima, has published a synopsis of the results obtained from the recent census, which was taken under the auspices of the late President, Don Manuel Pardo. Peru is now divided into eighteen departments, three littoral provinces, ninety-two provinces, and 764 districts. There are sixty-two large and sixty-six smaller cities, 1262 towns, 646 large and 5938 small villages. In Tarapaca there are seventy-two nitrate works; and in the whole Republic 4221 plantations, and 12,087 holdings. The total population amounts to 2,673,075 souls, of which 1,352,151 are males, and 1,320,924 are females. The most populous department is Ancachs, containing 284,091 souls. Next follow Puno with 256,594, Cuzco with 237,083, Lima with 226,922, Cajamarca with 213,243, Junin with 209,871, Arequipa with 160,282, Ayacucho with 147,909, Libertad with 147,541, Puira with 135,709, Apurimac with 119,246, Huancavelica with 104,140, Lambayeque with 85,984, Huanuco with 77,988, and Loreto (the Amazon country) with 61,125. The province of Yca contains 60,111 souls, Tarapaca 42,002, Tacna 35,706, Callao 34,492, Amazonas 34,245, and Moquegua 28,786. In Ancachs, Puno, Cuzco, Cajamarca, Junin, Arequipa, Ayacucho, Libertad, Puira, Apurimac, and Huanuco, and in Amazonas there are more women than men. But in Lima and Callao, in Huancavelica and Lambayeque, Loreto, Yca, Tarapaca, Tacna and Moquegua there is an excess of men over women; for these are the parts of the country where there are plantations employing foreign labour, where mining operations are carried on as in Huancavelica and Tarapaca, and where there are large seaports.

Peruvian Geographical Society.—A Geographical Society has been established at Lima, of which Don Manuel Pardo, the late President of the Republic, has been elected President; General Mendiburn is Vice-President, and Dr. Chacaltana and Señor Castañon are the joint Secretaries. There is a vast field for geographical research in Peru, and under the auspices of Señor Pardo the labours of this new Society can scarcely fail to be valuable.

Census of Travancore.—The feudatory kingdom of Travancore, in the extreme south of the Peninsula of India, has followed the example of British India, and completed a census of its people. The enumeration was made between the hours of 6 and 9 A.M. of the 18th of May, 1875, and the population was found to number 2,311,379. It was carried out exclusively by natives of India, most of these belonging to the Travancore State, and their intimate knowledge of the country has enabled them to give details of great interest to the ethnologist. It has also shown the comparative cheapness of native labour. The agency employed consisted of about 12,000 enumerators, but the total cost was only Rs. 42,639, or about seven shillings a head. The census of Ceylon, with nearly the same population, cost Rs. 99,080. In a geographical point of view, the Travancore kingdom merits a notice here. It has attained its present dimensions by absorbing petty independencies, and is ruled by a Kshatrya prince of the Lunar line. Situated in the extreme south of India, it has remained untouched by the successive waves of Muhammadans who have entered India from the N.W., and a large portion of its people follow the law of maternal descent in succeeding to property. The ruling family also still adheres to this law of inheritance.

Vladivostok.—Last year the German corvette 'Hertha' paid a visit to the Russian war-port of Vladivostok, on the coast of Manchuria. The harbour is closed by ice from November to March, and vessels requiring repairs cannot enter it during that period. A submarine telegraph connects the town with Nagasaki and Shanghai, and there exists thus telegraphic connection between that remote place and Europe. It was intended at first to convert Vladivostok into a first-class naval station, but its establishments for the present are limited to a few coal-sheds, a store-house, and a shop for the repair of machinery. The Russian flotilla stationed there consists of ten or twelve advice boats, gunboats and transports, and is manned by about 2500 men. The town itself is of no importance, and the country in its rear offers but few resources. Provisions are imported by seven mercantile firms, of whom three are German. Vladivostok is important, however, as a station from which the Russian plans of colonisation may be supported and directed. This colonisation is now being directed towards Korea. A portion of the female convicts annually transported to Siberia is forwarded to the military stations in this remote corner of Asia, to be employed as servants or otherwise. Many of them find husbands amongst officials or soldiers, and Russian villages are thus gradually spreading towards the south.

The commerce of Vladivostok is, at present, of small importance, and is confined almost to the importation of provisions and of naval stores. In 1872 there entered eighteen vessels of 2789 tons; in 1875, thirty-four vessels of 12,724 tons, of which eleven were German. The merchants appear to do a lucrative business. Gold-washings have been established by a German trading company in conjunction with an American firm, but it is doubtful, as yet, whether the speculation will pay.

The Russians looked forward to the establishment of Vladivostok with great expectations, none of which have hitherto been realised. They evidently hope to be able to establish themselves at no distant period at a spot more favourably situated, either on the coast of Korea, or on the Japanese island of Tsu-sima, which has a safe harbour.

Pundit Nain Singh, the Indian Explorer.—Pundit Nain Singh, the well-known Asiatic explorer, whose successful journey across Tibet and previous exploits were noticed in our number for June last, has been compelled to retire from the service mainly on account of ill-health, contracted during his perilous and trying journeys. He has been recommended by Government for a grant of the fee-simple of a village in Rohilkund, and of a sum of £100 in recognition of his valuable services. We are glad to perceive that these services have not been unrecognised by geographical authorities. From recent proceedings of the Paris Geographical Society, it appears that that body have communicated to our Ambassador their intention of forwarding to him a gold watch for presentation to the Pundit, in token of their admiration of his last exploring achievement. As the gold watch presented to the same individual by our own Society, for his journey to Lhasa and Lake Mansarowar in 1855-6, was unfortunately stolen, this act, coming as it does from a sister Society in a foreign country, will be viewed as a truly appreciative and graceful action.

Sir B. Robertson's Visit to Haifong and Hanoi, in Tonquin.—Sir B. Robertson, Consul at Canton, was deputed in April last to visit the ports of Haifong and Hanoi, which have been lately opened by the French in Tonquin, and arrived in H.M.S. 'Egeria' at the former settlement on the 7th April. Haifong is situated on the right bank of the Cud-cam, a branch of the Song-koi, or Red River, with which it communicates by a canal. Haifong is now a considerable village, with a fair trade in silk, tin, and lac. It is the highest point to which vessels drawing 14 feet of water can ascend the Cud-cam, and for the present is the shipping port of Hanoi, though the Red River offers no insuperable obstacles to navigation, in Sir B. Robertson's opinion. From extensive works going on there, it would appear as if the French intended it to be the anchorage for foreign vessels. Sir B. Robertson called on the Tong-duc, or viceroy, and on the French consul, both of whom appeared to welcome the prospect of British trade. There is much business going on in the town, the shops being well stocked with goods of native workmanship, especially bamboo work, silk and cotton piece goods, &c. Rice is the staple food of the people, who look well-fed and healthy, and have a fair amount of muscular development. The Tonquinese are evidently of an intermediate type between the natives of India and China proper. The population of Hanoi, the capital, is estimated at from 150,000 to 200,000 Tonquinese and about 3,000 Chinese. The principal river, called Song-koi, in Annamese, is said to rise in Tibet, and is navigable from Manghao, the last city in Yunnan, down to the sea, a distance of 414 miles. The borders of Tonquin and Yunnan have for some time been in a disturbed state, being in possession of two clans of Chinese, who are at war. Were the Governments of Tonquin and China to give their consent, and the blackmail leviers cleared out, a good trade would undoubtedly be done, especially in metals, in which Tonquin is rich. In conclusion, Sir B. Robertson considers that there is no fear of the trade of Western China being monopolised by either this route or that *viâ* Bhamo. The more openings there are, he remarks, for the inlet and outlet of trade the better.

Correspondence.

——:o:——

THE PECHENEGS OR KARAKALPAKS.

To the Editor of the "Geographical Magazine."

Sir,—Having considered the Berendeens and the Comans, we will now turn to the Pechenegs. Zeuss thus gives their synonymy: they were called Pizenaci by Luitprand, Pecenatici by Cosmas of Prague, and Pincenates, Pecinei, Petinei, Postinagi by other western writers, Patzinakitai by Constantine Porphyrogenitus, Peczenjezi by the Slaves, and Bisseni or Bessi by the Hungarians. This last form of the name probably gave its appellation to Bessarabia. I may add that Snorro calls the people Pezina-vollr.

That the Pechenegs were Turks there can be no doubt, and the position is not controverted. Ibn el Wardi tells us they were "a Turkish race who had separated from the other Turks and settled between the Khazars and Rum." He calls them Behnakije, and tells us that "although they had lived there so long they had not any houses" (Zeuss, *Die Deutsche, etc.*, 743).

Anna Comnena tells us they spoke the same language as the Comani, while Betchena is named as a tribe of the Ghoz Turks who were in Persia with the Seljuki (D'Ohsson, *Abul Cassim*, 177).

Their first appearance in Europe is dated by Constantine Porphyrogenitus about the year 894-899, when, as he tells us, they were attacked by the Khazars and Uzi in alliance, and driven from their ancient seats (Stritter, iii., p. 797). Previously, according to the same author, they had lived on the Atel, *i.e.*, the Volga, and the Geech, *i.e.*, the Jaik, and were the neighbours of the Uzi and Mazari (*id.*). In another place he tells the story in a different way. He says that "the Patzinakitai, who were formerly called Kangar—which name among them meant nobility and strength—having taken up arms against the Khazars, were beaten, and deserted their country, and were obliged to enter the land inhabited by the Turks," *i.e.*, with him the Magyars (*id.*, 798). This name Kangar is clearly a corruption of Kangli or Kankali, and is a similar form of the name to that we find used by one of the missionary friars.

This does not mean that Pecheneg and Kankali were convertible terms. The author already quoted clearly shows this when he tells us that the Pechenegs were not all called Kangar, but only three of their tribes or sections, who were stronger and nobler than the rest (*id.*, 808).

After a while the Kangar Pechenegs quarrelled with the Magyars and defeated them; one section of them were driven to take refuge in the direction of Persia, and the other went westwards towards the Carpathians, and settled in the district of Atelcusu. Cus has been compared with the Hungarian Köz, an island or piece of land between two rivers, while Atel or Itil is the ordinary Turkish name for river (Zeuss, 751). The country referred to was doubtless the district between the Danube and the Dniester.

The Pechenegs now definitely occupied the old land of the Magyars on either side of the Dnieper. They divided their new country into eight provinces, four of which were west of the Dnieper, and four east of that river. The former four were named respectively, Chopon, which was the nearest to Bulgaria, Gyla, which was nearest to the Magyars, Kharoboe which was nearest to the Russians, Ertem, or Jabdertim as he elsewhere writes it, nearest to Ultin ? Derblen ? Lenzen ? and the other Slaves, *i.e.*, probably the districts of Gallicia and Poland.

The remaining four districts, namely, Tzur, Calpee, Talmat and Tzopon, were east of the Dnieper (*id.*, 806 and 807). Constantine tells us that after some years the Pechenegs once more invaded the land of the Magyars, who, with their chief Arpad, were forced to migrate into Great Moravia, *i.e.*, into the modern Hungary (*id.*, 798, note). And we are further told the Pechenegs occupied the land thus deserted.

Thenceforward they held the steppe-land of the Nogays from the Danube as far as the Don. They occupied the lower reaches of the Dnieper, and effectually closed that river, which had hitherto been the main artery of communication between Byzantium and the Baltic.

The account of Constantine is confirmed by the Russian annals. Nestor tells us the Pechenegs appeared for the first time in Russia, *i.e.*, in the principality of Kief, in the year 915. They made peace with Igor, the Russian chief, and advanced as far as the Danube, and had intercourse with the Greek Empire (*op. cit.*, *ed.* Paris, i., 53).

It is not my present purpose to tell the story of the long and fierce struggle which the Pechenegs fought both with the Russians, and the Greeks of Byzantium. This will form the subject of a memoir elsewhere. My present purpose is purely ethnographical.

As I have said, Constantine tells us that three divisions of the Pechenegs were Kankalis. These three were the Ertem, Tzur and Gyla. They formed the *élite* of the nation, and I must defer the consideration of them to a future letter, when I hope to deal with the Kankalis; at present we will limit ourselves to the remaining five divisions who constituted the Pechenegs proper.

The meaning of the word Pecheneg is not well ascertained. The majority of Turkish tribes are called after some noted leader, who has led them to victory, or been otherwise famous. Such is the origin of the names Osmanli, Seljuki, Nogay, Uzbeg, &c. Kipchak is a well-known personal name among the Turks, and it would seem that the Kipchaks were named in the same fashion.

It is very probable that the Pechenegs were named in the same way. We, at all events, meet with the name as a personal name. Thus we are told that when Yermak the Cossack attacked the Siberians on the Tawda, and they had assembled in the neighbourhood of Pechenka, a prince called Pecheneg was among the slain. Sviatoslaf, the Russian hero, was killed by the Pechenegs in 972, and we are told he was beheaded in Pechenka curia: so that we have two Pechenkas, or lands of the Pechenegs, one on the Dnieper and the other in Siberia. The name Pecheneg occurs for the last time in the Russian annals, so far as I can make out, in the year 1152. But in 1162, and in that section of Nestor written by the Fourth Continuator, we find a new name, namely, the Black Klobuks, or Black Caps; and we read that the Poloutzi having made a raid as far as Kief, and destroyed a great number of kibitkas—*i.e.*, Tartar arabas or carts—killed Voiborn. Upon this the Black Klobuks went in pursuit, overtook them near the banks of the River Ross, killed a good many of them, and recovered the captured booty (Nestor, ii., 98). They are also mentioned in 1174, 1187, 1190, 1192 and 1200 (*Golden Horde*, 454-456).

We again meet with the name at the time of the great Mongol invasion of Europe under Batu Khan. Raschid tells us that in the autumn of 1239, Batu, with the other princes, marched against the Russians and the Black Caps (D'Ohsson, ii., 627). Now the name Black Caps or Black Bonnets is a specific tribal name among the Turks. The Turkish equivalent for Black Caps being Karakalpaks.

The Karakalpaks still form a separate aggregation of Turkish clans, whose importance is now much reduced, but who have an old and distinguished history. They formerly, and before the destruction of Bolghari, lived in its neighbourhood and along the banks of the Volga, from Kazan to Astrakhan. (Von Hammer, *Golden Horde*, 26 and 363). And it is not improbable that the chief called *Bachiman*, who ruled on the Volga at the time of Batu's invasion, was the ruler of these eastern Pechenegs.

It was Timur's cruel campaign in the Kipchak, in 1397, which apparently caused their migration to the south-east (*id.*, 364). They then migrated to the shores of the Sea of Aral, and the banks of the Syr Daria, and the Kuwan Daria, where they had fixed quarters in winter and nomadised in summer (*Asia Polyglotta*, 222). The Karakalpaks were still settled about the Lower Jaxartes in 1730, and in 1732 they followed the example of the Little Horde of the Kirghiz Kazaks in submitting to Russia. The Kirghizes oppressed the Karakalpaks very persistently, and at length drove them away. One section found shelter in the Khanate of Khiva and another in that of Bokharah (Michell's *Russians in en tral Asia*, 311-313).

The Karakalpaks in the government of Khiva are described by Vambery (*Sketches of Central Asia*, 293-295). These Karakalpaks of the Syr and Amu Daria are known as the Lower Karakalpaks; and when they fled to the south-eastward, another body escaped more to the north, and took refuge with the Kalmuks (Michell, 312).

As I have said, before their dispersal by Timur they lived on the borders of the Bashkirs, and the Bulgarians of the Volga, and were known also by the name of Manguts, *i.e.*, flat-noses; a *sobriquet* they well deserve, judging from a Kirghiz proverb quoted by Vambery, that "the Karakalpak has a flat face, and is himself totally flat." One of the principal features of the Karakalpaks, distinguishing them from the other Turkish tribes, is their possession of considerable quantity of hair on their faces. This I can testify, from having seen the beautiful photographs of them, exhibited by the Government of Tashkend at the recent Oriental Congress at St. Petersburgh. Bakui says of the Bachenaks that they had long beards and large moustaches: he adds, their food consisted chiefly of millet (D'Ohsson, *Abul Cassim*, 117 and 118). Vambery says that a favourite food of the Karakalpaks is Kazan djappay, *i.e.*, meal baked in a pan with fat.

For these reasons I deem it exceedingly probable that the Pechenegs proper were the same people as the Manguts or Karakalpaks of our day.

The western division which settled on the Dnieper, and which was composed of Kankalis and Pechenegs proper, became, doubtless, to some extent mixed with other tribes during the domination of the Mongols, but they formed, I have no doubt, the main portion of the Nogay hordes which until recently depastured the steppe-lands of Southern Russia. In the list of the tribes of Kipchak given by Novairi in 1325, and which, doubtless, consisted in the main of Nogays, we find one named Kara Burkli, *i.e.*, Black Caps, equivalent to Karakalpaks. One of the western tribes of the Nogays was called Budzuck, doubtless a form of Pecheneg. Another is called Mangut, while two others are named Kanli or Kankli.

Lastly, Strahlenberg (282) mentions that "east of the Jaik, and close to the country of the Karakalpaks, there are still places called Talmasata and Curcutata, which we may compare with Talmat and Tzur, given by Constantine Porphyrogenitus as the names of two of the eight sections of the Pechenegs."

My conclusion is that the Pechenegs were originally Manguts or Karakalpaks, and that, having been joined by certain tribes of Kankalis, they invaded Europe; and that the Nogays represent the mixed race which thus arose, while the Asiatic Manguts preserve for us the ancient features of the people. I may add that Von Hammer says that Bejnak means the allied or the related (*Golden Horde*, 21).

I remain, yours sincerely,
HENRY H. HOWORTH.

DERBY HOUSE, ECCLES.

——: o :——

POLAR EXPEDITIONS.

To the Editor of the "GEOGRAPHICAL MAGAZINE."

SIR,—Perhaps you would kindly make space for a few remarks on the above important subject, in your widely circulating and valuable magazine.

When at the present time so much interest is felt in the results of the late Arctic Expedition, why not examine the aspects of, and inquire into the feasibility of the *route* hitherto generally taken by explorers?

Was it that each succeeding explorer just moved in the groove marked out by his predecessor, and merely satisfied himself by proceeding a degree or so farther north, taking advantage of previously acquired knowledge, and wishing, at least *in extremis*, to have terra-firma within reach? Or if not, why not boldly launch forth, east of Greenland, north by Spitzbergen, &c.? I mean, of course, no disparagement whatsoever to late explorers, to whom all credit is due; but let us now examine the comparative advantages and disadvantages of the route west of Greenland and that east thereof.

Imprimis:—Baffin's Bay is narrow, the *locale* of bergs, from which, on account of that very narrowness, there can hardly, in emergencies, be any escape, whereas by the eastern route there is "ample room and scope enough" to avoid those icebergs, which here are of comparatively rare occurrence.

But my second reason will, I trust, receive attention and be perhaps improved upon by men more conversant with this grave and sublime subject, and that is the *mean annual temperature* west and east of Greenland.

Now, with the exception of the Siberian *tundra* and steppes, there is no known region of so low a temperature as the region of and north of Baffin's Bay. In latitude 60° or less in that region eternal ice exists, and a few degrees farther north will find zero always co-existing; whereas, east of Greenland, the same results are only arrived at even north of 80°. Here then, with an open sea, the isothermal line of temperature favours the explorer, and if there be any use (as there must) in deduction from all ascertained facts, it is only *more than* probable that the coldest tract on earth is not by any means circumscribing the North Pole precisely, but somewhere about the Magnetic Pole, or in the direction of the Siberian tundra; and unless our maps of isotherms be misleading, the cold experienced by the gallant Captain Sir George Nares and Captain Markham could have been hardly experienced even at the North Pole, by the eastern route.

I trust then that scientific men will direct their future observations in this direction, and that coming explorers will benefit by their researches. Should you, Mr. Editor, give insertion to these few remarks, I may return to the subject, hoping that discussion may elicit some beneficial results, and that general knowledge and navigation will receive an impetus, leading future explorers to navigate in a direction where I feel convinced success is only (if at all) to be accomplished.

I remain, dear Sir,
Your constant reader,
ROBERT T. LITTON.

KILMAGANNY GLEBLE, CO. KILKENNY,
20th January, 1877.

Proceedings of Geographical Societies.

——: o :——

ROYAL GEOGRAPHICAL SOCIETY.

Meeting of 8th January, 1877.

ON the minutes of the previous meeting (December 12th) being read by the Secretary,

Sir MORDAUNT WELLS complained of the arrangements made at the last meeting in St. James's Hall as regarded the comfort and convenience of Fellows, and the manner in which the patronage tickets, to the number, as he heard, of 500, had been distributed.

The PRESIDENT ruled that the speaker was out of order, and justified the action of the Council by saying that, as 6000 persons were entitled to admission it was physically impossible for half of them to be accommodated.

Mr. ROBERT MICHELL then read his paper on

"THE RUSSIAN EXPEDITION TO THE ALAI AND PAMIR IN 1876."

He commenced by giving some particulars respecting the origin of the Kara Kirghiz; he then went on to notice briefly the various journeys across the Pamir from the time of the earliest travellers, and pointed out that the meridional range discovered answered closely to a section of Ptolemy's Imäus.

The Russian Expedition was undertaken to reduce the Kara Kirghiz to obedience, this population having, since the annexation of Kokand, successfully defied the efforts of the Russians to secure safe passage for their caravans. With this object General Kaufmann ordered Major-General Skobelef to organise a detachment, which, under his command, should advance to the Alai, and march into the very heart of the summer pastures of the Kirghiz, and so coerce these nomads. The expedition was furnished with a military topographical party of eight, besides three persons, Messrs. Bonsdorf and Oshonin, and Captain Kostenko, who were charged with the astronomical and barometrical labours, the natural history department, and the geography and statistics respectively. The scientific members of the expedition left Tulsha on the 31st of July (N.S.), overtaking the military force at Kizyl-Kurgan. The road led for the most part along high mountain-ledges by the Gulsha River, over which bridges of frail construction occasioned no small trepidation to the troops. At the end of the second march the detachment emerged from the Gulsha defile, and having crossed the Kizyl-Kurt range, ascended the picturesque Archat defile to the pass over the Archat Mountains, which are exceedingly steep. The absolute height of the pass was 10,300 feet. Further west is the Taldyk Pass, which is considerably less steep, and may therefore be more easily adapted for a carriage-road. From the top of the pass a magnificent panorama opens to the view. In the foreground is the Alai plateau, beyond it rises the Trans-Alai mountain-range. The Kizyl-Su flows near the foot of the descent from the Archat Pass, and winds in a bed about a verst (two-thirds of a mile) wide, and divided into several arms. At that time of the year the water is about 28 inches deep, is potable, and of a red colour from the clay in its bed. After fording the river the detachment proceeded across the Alai Steppe, which was thickly covered with feather-grass and *kipetz* (which latter is very nourishing for horses), and thence to the base of the Trans-Alai range, where they remained some few days. From this position to the summit of the Kizyl-Yart pass was 18 miles. A scattering of gigantic horns of the *Ovis Poli* was the only evidence of life along this line of country. After crossing a second range of no great altitude, the division came in sight of a large lake, the Kara-Kul, lying within 43 miles of the base of the Trans-Alai Mountains. The water of the lake was azure, and an island was observable in the middle of it. The surface appeared to be slightly frozen. According to the guides, Kashghar was distant only a leisurely ride of six days.

Captain Kostenko describes the ride up the defile to the Kizyl-Yart pass as one of great difficulty, owing to the broken nature of the ground. He is, however, of opinion that the whole road, from the mouth of the defile to the top of the pass (11,700 feet), might be made available for wheeled carriages by removing the stones which block up the bed of the river and cover the mountain slopes. The Kara-Kul Lake is encircled by mountains, mostly snow-capped. Captain Kostenko visited it on the 3rd (15th) August, and found that a considerable portion of the lake is occupied by islands and necks of land having the appearance of a high longitudinal ridge. The largest island adjoins the northern shore, and is 8 versts long by 4 wide. It is sterile and quite unfit for habitation by man, but traces of men and beasts were found, and a great quantity of skeletons and horns of the *Ovis Poli* lay scattered about. Captain Kostenko ascended to the highest elevation of the island, and from that point of view he appeared to be in the centre of a gigantic crater filled with water. During the ensuing days he and Captain Lebedef made a survey of the lake on three sides. It consists of two sheets of water east and west, connected by a strait in the neck of land. The length of the lake is 22 versts from north to south, and the breadth along a line passing through the strait is 17 versts from east to west. It has not a single outlet, but, on the other hand, receives several mountain streams, all of which are fordable. On the western side the spurs of the mountains rise from the water's edge, and project in the shape of capes. The water is exceedingly cool and clear, but bitter to the taste. There are fish in it, and plenty of water-fowl frequent its surface and margin. The flat beach along the courses of the streams is covered with a thin but nourishing grass, which affords sufficient, if not abundant, food for beasts. The natives state that rain but rarely falls, and that once a week the level of the lake rises; this last peculiar phenomenon being apparently confirmed by Captain Kostenko's own observation. The expedition remained several days on the shores of the Kara-Kul lake. On the 6th (18th) August, Captain Kostenko started along the eastern margin for Lake Riang-Kul in the Sary-Kol district, towards the Kashghar boundary. A great number of little lakes or lagoons separated from the Kara-Kul by strips of land confirm the belief in its rapid desiccation. After having travelled along the Ala-Baital defile, and followed the course of the Uzbel-Su, the party reached the Uzbel Pass, which separates the basin of the Kara-Kul from that of the Sary-Kol and Tarun-Gol. From its summit (12,500 feet) magnificent views are obtained, westward along the course of Uzbel-Su and Chon-Su, and eastward along the valley of one of the sources of the Kashghar Daria, until a long way ahead the view is barred by a grand mountain-range rising considerably above the snow limit. This is probably the range mentioned by Colonel Yule in his sketch of the geography and history of the sources of the Oxus, and which forms the eastern boundary of the Pamir plateau, dividing it from Eastern Turkistan. Referring to Mr. Hayward, Colonel Yule says that the peaks of this range attain 20,000 to 21,900 feet. It appeared to Captain Kostenko that the range was much higher, and that the peaks rise to about 25,000 or 26,000 feet. The late M. Fedchenko disputed the existence of a meridional range on the east side of the Pamir, saying that Hayward had simply taken the abrupt side of the Pamir for a transverse mountain-range. Captain Kostenko, on the other hand, was impressed with its grandeur. It lies about 53 miles from the Uzbel Pass, and beyond it lies Kashghar, 40 miles further. Humboldt, it may be remembered, laid down the existence of a meridional range, named by him the Bolor Mountains. More recently Severtsoff and Fedchenko, and then English travellers, denied the existence of the above-mentioned mountain-chain, arguing that the Thian-Shan and Himalayan systems combined to form the block which Humboldt took for a meridional range. Shaw and others were of opinion that the connection of the two gigantic mountain systems was by means of a series of ranges mainly extending from east to west. The structure of the Pamir, according to Kostenko, is really quite different. The discovery of this range is an important acquisition to geographical science, and he considers it would be proper to give it the name of Constantine, in honour of the august patron of geographical science in Russia.

Through lack of provisions, Captain Kostenko was unable to push on to the Sary-Kol and compelled to return by the Uzbel Pass and the little Chon-Su defile. On emerging from thence, one comes upon a point where three roads converge—one to Badakhshan, one to Kokand (over the Kizyl-Yart), and the other to Kashghar (over the Uzbel Pass). The main force of the Alai column was rejoined at Archa-bulak, at the southern base of the Alai range. The whole distance marched by Captain Kostenko's force, from the mouth of the Kizyl-Yart defile to the Uzbel Pass, was 90 miles.

Prince Witgenstein, who was attached to the expedition, had previously passed up the Chon-Su river, returning by way of the Tuyuk-Su Pass, and crossing the snowy range. It was ascertained on inquiry that the Aksu-Murghab flows 53 miles in a south-easterly direction on the other side of the pass, after which that river emerges on a wide elevated plateau which is traversed by a large and wide river called the Kara-Daria, and by a road leading to Kashghar and to Afghanistan.

Captain Kostenko makes the following general observations on the portion of the Pamir visited :—

The Trans-Alai Mountains, having the appearance of an immense white-crested wall, limit the Pamir on the north. Beyond this range extends a high land gradually rising towards the centre This high land is intersected in all directions by mountain-ranges, some of which are snow-capped and others not, but, generally speaking, having only a small elevation above the adjoining valleys and plain surfaces. The plains and valleys, or hollows, do not extend in any one particular direction, and in most cases are not wide (say two or three versts); they frequently turn off into side openings. The valleys, as well as the mountain-slopes, are bare. They have neither trees, brushwood, nor grass. Small strips or patches of grass occur only along the courses of the mountain-streams, and this grass is in some places thick and succulent, affording food for the cattle of the nomads.

The mountains being of a soft formation, all the passes are comparatively low and easy. The streams, pouring down from no great altitudes, offer no impediment. Generally speaking, the roads on the Pamir are very easy in all parts. The ground is either sandy and stony, argillaceous, sandy-salinous, or simply salinous. In those parts where the salines have got dry, the ground is covered with a thick layer of magnesium, which glistens like snow. Occasionally, one falls in with moist places covered with a thick but not high grass, and wheresoever the ground is soft enough to retain impressions one may observe the tracks of wild beasts. Thus the tracks of wild goats, horses, wolves, and deer were seen. There used to be here an innumerable quantity of arkharas (*Ovis Poli*), but they seem to have been all destroyed by the disease among them in 1869, as may be concluded from the abundance of immense heavy horns scattered over the whole line of country which we traversed. Neither a single live specimen nor the tracks of one were seen. The horns were always found with the skull, and no one seems to have ever seen the rest of the carcass.

There are neither bears, nor tigers, nor wild yaks in the portion of the Pamir over which the Russians passed.* The birds noticed were eagles, kites, red-beaked crows, and numerous small species.

Notwithstanding the severity of the climate of the Pamir, the country is inhabited by nomads, who come in the summer from Kashghar, Shugnan, Karateghin and other places. They occupy themselves with cattle-breeding. The severity of the climate is the greatest discomfort to man on the Pamir. In the summer the days are extremely hot and the nights are cold; the Chon-Su rivulet freezing with a coating of ice a quarter of an inch thick. The rareness of the atmosphere is also a source of great discomfort on the Pamir, even in summer; but Captain Kostenko considers that the stories of its injurious effects are somewhat exaggerated.

On the 16th (28th August) a portion of the Alai expeditionary force from Archa-bulak was moved along the Kizyl-Su to Darant-Kurgan, a distance of 43 miles. Captain Kostenko accompanied a half company of Prince Witgenstein's, who ascended the course of the Tuz-Altyn Daria. The head-water of the river is remarkable as giving rise to another stream flowing in a diametrically opposite direction. The Ters-Agar streamlet falling from a snow-capped summit in the left or western range, divides into two at the base of the mountain, one flowing northwards and forming the above-mentioned Tuz-Altyn Daria, and the other running due south, preserving the name of Ters-Agar, and reaching the large Muk-Su river. The mountains closing it on the south are covered with snow over two-thirds of their height, and some of the peaks attain an altitude of at least 25,000 feet.

The Muk-Su is a large body of water, and is not fordable. The head of the river may be said to be at the spot where Kostenko came down into the valley, being formed by the confluence of several streams, viz., the Sel-Sai,† the largest of them, which pierces through the southern range (goù), and flows in a north-western direction; the Koündy, which flows west; the Suok-Sai, which falls into the Muk-Su, bearing a course towards the south-west; and finally, the above-mentioned Ters-Agar, which comes in from the north. The valley of the Muk-Su extends from east to west, with a slight southing (5°).

This valley preserves the same character for 40 versts (27 miles) as far as the Hoja-t-äb "tuga," after which it contracts, and the road passes over the mountains, where the path, according to the natives, is not practicable to horsemen, on account of the boulders. The river passes into Karateghin, where it joins the Kyzil-Su, and combines in forming the Surkhab affluent of the Oxus.

Captain Kostenko is the first European who has obtained a sight of the head-waters of the Muk-Su river. The valleys of the Kyzil-Su and Muk-Su are totally different in character. The first-named river is much longer than the second, and right up to the Karateghin territories it flows through a valley widening out 20 versts (13⅓ miles), and carpeted with grass over its whole extent. This river is not deep, and is fordable at all points as far as Darant-Kurgan, *i.e.*, throughout a length of 100 versts (67 miles). The water is red in colour, from the red clay in which it runs. The Muk-Su, on the other hand, has not so great a length, but is a large body of water. It is difficult to say which of the two rivers is to be taken as being the main head-water of the Surkhab. It is perhaps more correct to say that the Kizyl-Su and the Muk-Su equally combine within the Karateghin territories to form the great river which flows to the Oxus.

After an interview between the envoy of Karateghin and General Skobelef, the latter marched to Great Karamuk 19 miles along the Kizyl-Su. The meadows in this locality are very rich and attract numbers of Kirghiz. The troops afterwards ascended the valley of the Kok-Su river towards Kokand. The Kara-Kazyk, one of the principal passes over the Alai, is at the distance of 20 miles along this defile. This summit of the pass is 12,600 feet high, the crest is very narrow, and bears some resemblance to a comb (*tarak*). Both the ascent and descent are very difficult. Shah-a-Mardan is about 30 miles from the pass; it is well-known for the beauty of its situation, nestling as it does at the opening of several defiles, and, as it is not confined by mountains, the view is charming and varied. The Saint buried here (who is locally supposed to be Ali the Fourth, Caliph of the Mussulmans) is the patron saint of the country. The next station was Vadil, in the centre of the Chemion district, one of the new administrative subdivisions of the Ferghâna Valley since its annexation to the Russian Empire.

Colonel H. YULE said that the Russians seemed to attach a great deal of importance to the discovery of the so-called meridional range, but Lieutenant Hayward had described the same mountains seven or eight years ago, and, after him, Captain Trotter stated that the eastern portion of the Pamir was bordered by a very high, snowy chain of mountains, running from north to south. The Russian Expedition had attached a fictitious importance to this, recalling the ideas of Humboldt, and going back to the views of Ptolemy, and they proposed to call the range after the great patron of geographical science in Russia, the Constantine Range; but if it had to be called after the great pillar of geographical science at the time of its discovery, it should have the name of Roderick or Henry. It was said in the paper that Ptolemy described the Imaüs as a meridional range from north to south, and as distinct from the mountains to the south and north of it; but the fact was that Ptolemy's authority, so far as it went, was just the other way. Ptolemy called all the mountainous region by the same name—"Imaüs"—which was merely a Græcising of the word Himalaya, or whatever was the form of that word in his day. The real, prominent distinction between these two parts of Central Asia was not physical, but historical. The Himalayas proper had been in all history the great impassable barrier between Central Asia and India, while the Pamir had been the great road between Western and Eastern Asia—between Asia inhabited by Persian and Turkish races, and Asia inhabited by the races from time to time subject to the Chinese Empire. In fact the Pamir was a sort of sea-wall, against which the ocean of Chinese domination had beaten again and again in the course of the last three thousand years. What Ptolemy said about it was probably the most interesting part in the dry bones of his geographical tables. In the introduction to his geography, when discussing the length of the habitable earth, not having many data at hand, he quoted the account of the journey of a certain Macedonian merchant, Maës Titianus, who went to China for silk. Mr. Michell alluded to this, and spoke of the approach to Bactria (the modern Balkh) having been from the north. That was an old idea, but an entirely mistaken one. Of late years a perfect key had been discovered to this journey of Ptolemy's merchant, for he mentioned that after leaving Bactria they travelled somewhat to the north, and entered the hill-country of the Comedæ. It was now known from the Chinese travellers, who had been translated by the great French scholars within the last twenty or thirty years, where the exact position of the Comedæ was. The district was described as having Shignan to the south, Khotan to the east, and the Oxus along the south-west. The position of London on the Thames could not be described more exactly, and that fixed the position of the Comedæ in Roshan. From the hill-country of the Comedæ the merchant went somewhat to the south, and then turned up a great gorge which led him to the "stone tower," traces of which would probably be found when the hill-country of Shignan was better known. From thence they crossed the Imaüs into the empire of China. So far, then, as Ptolemy's authority bore on the physical history of this isthmus of mountains, it was in favour of its identification with the Himalaya; though his authority in that respect was not worth a farthing. The Russians, too, seemed to desire to return to the old name of Bolor. Their proof of the name seemed to be something like Jack Cade's proof of his ancestry. His father was a bricklayer, and his friend said "Yes, and he built the chimney of my father's house, and the very bricks are there to this day to testify thereof." The name "Bolor" arose entirely out of a mistake, and he hoped it would not be used again, because it had been found that there was a range of mountains running from north to south. One thing had struck him in connection with the name of the Muk-Su, which the Russians had described as a tributary of the Surkhab, a branch of the Oxus, because it curiously illustrated how different was the fate of truth and falsehood. In that fictitious narrative, which caused so much discussion some years ago, this region was crossed and recrossed by an imaginary traveller who gave many names. Since then new names had been learnt and old ones recovered, but none of the names mentioned by the German traveller had been recovered. The name "Muk," however, occurred in the *History of the Mogul Emperors*, where a rebellious brother was sent into banishment, and made Nawab, or whatever it was, of Karateghin and Muk. Probably that name of Muk had hardly ever been heard since the sixteenth century until within the last two or three years. Thus the real name turned up in the real country, while the false names were heard of no more.

---

* Colonel Yule asserts the contrary.

† "Sai," probably a corruption of "Su," water.

Sir H. Rawlinson said he had very little to add to what Colonel Yule had said. There were a few points upon which he did not entirely agree with Colonel Yule, but generally he was in perfect accord with him upon this subject. All his recent inquiries had led him very much to the idea that the real route of Ptolemy's merchant was up the Surkhab. All the late Russian surveys had been in the north-east portion of the Pamir, about one-third of which they had crossed, and their approach in that direction had not unnaturally excited a good deal of interest, and perhaps apprehension, in India; but he thought the result of the survey had been to show that that line of country was quite impassable by an army; but it was an easy country for the Kirghiz to pass over. He felt bound to protest against the idea that the Kirghiz were of Aryan derivation. If ever there was a pure Turanian race it was the Kirghiz; and the notion of their being Aryans was one of Klaproth's paradoxes, like his fables of the Irrawaddy and the great river of Tibet, These Kirghiz now possessed the whole of the Pamir, and found it very easy to travel over it in all directions, but it could not be crossed by an army. It contained no supplies except herbage in summer. If ever the Russians approached the Valley of the Oxus, which was a very rich and attractive country, it would be down the line of the Surkhab or the great Waksh River. Perhaps he would rather surprise Colonel Yule when he stated that he believed that was Ptolemy's old route, and that the famous stone tower would be found somewhere in Karateghin; in fact it might be the very limit of the Muhammadan world, the Rasht of the geographers. Washgurd, which was the great capital of this region, was, he believed, at Faizabad, from whence there was a river—the Ilik—which was the route from Washgurd towards Rasht, which would probably be found at Garm. In Timur's campaigns, when they wished to pass from Hissar to Mogulistan, they invariably went up this river. Karateghin was first mentioned in the wars of Timur, the name being derived from Karateghin, who was the governor of that country, and who died in Affghanistan. The extreme post of the Muhammadans was at Rasht, and the only road from the rich country of Hissar up into the Valley of the Jaxartes was by the Muk-Su, down the Valley of the Murghab. He believed there was a European still living—Colonel Gardiner—who had actually crossed from the Valley of the Oxus into the Alai. In the biography of that extraordinary man, which was published by Sir Henry Durand in the *Friend of India*, some ten or fifteen years ago, it was distinctly stated that Colonel Gardiner did pass from Badakhshan to the Alai, and he ought to have some information concerning those countries of the greatest value; but his papers were in such a chaotic state that nothing worth geographical discussion had ever yet been recovered from them. No doubt the questions of physical geography which arose in consequence of these Russian discoveries were important, but he quite agreed with Colonel Yule that there was nothing very new about them. The so-called meridional range was, he believed, not meridional, but slanted off to the west. Neither was it a separate range, but merely the series of culminating points of the ranges which transect Pamir, and of which the Alai and Trans-Alai are branches.

Sir Douglas Forsyth said he exceedingly regretted that Captain Trotter, who was more competent than any other Englishman to speak on the subject before the meeting, was not present, but in a short time he would read a paper upon it. He did not want to say much about Ptolemy; in fact he was rather afraid to touch the subject at all, but Heeren, in his *Researches on Asiatic History*, suggested that between Kashghar and Kokand, over the Terek Pass, and so on to Samarcand, was the great route by which the trade from China passed to the west; and certainly if the traders did not take that route they were very silly, for it was decidedly the easiest.

Sir H. Rawlinson said the line passed through Balkh.

Sir Douglas Forsyth replied that it also went to Samarcand.

Colonel Yule; Never.

Sir Douglas Forsyth was of opinion that it did, and went to Kashghar. The men connected with his mission went from Chatir-Kul across to Wood's Lake, down to Kilapanja, and back to Yarkand. Captain Kostenko saw the meridional range for a day or two, considered he had discovered it, and called it after the Grand Duke Constantine; but the English Mission at Kashghar before then saw it day after day for about six months, and did not attempt to give it a name; but they learned the actual names of the different peaks. The range was not in so straight a line as it appeared on the map. He described the course which the range took, and said he believed the smaller Kara-Kul was the head of the Yaman-Yar. The Russian travellers spoke of Kara-Kul as having no outlet of any kind, and that matter had given him a great deal of trouble. Everybody he asked about it told him a different story. Some said it had an outlet to the west, others to the east, others that there was an outlet at each end: but nobody ever suggested that it had no outlet at all; and, with all due deference to Mr. Michell's authority, he did not think it had yet been proved that there was no outlet, for Capt. Kostenko had not actually been round it. In the Pangong Lake, near Leh, a traveller might keep close to the edge, and go almost entirely round the lake, without finding an outlet, but at the west end, in a gorge about a mile below, the water issued forth with as great force as if it came directly out of the lake itself, there being an underground passage. He joined with Colonel Yule in thinking that the word "Bolor" ought to be absolutely abolished, because it was unknown to the present inhabitants of those parts. Some centuries ago, however, a country called Bolor was so accurately described, that the boundaries might almost be walked blindfold.

General R. Strachey hoped that all travellers who had their accounts translated into another language would have such an excellent interpreter as Mr. Michell. He entirely agreed with Colonel Yule regarding the general view that should be taken of the mountain-ridges that had been discussed. When a mountain-range was spoken of, it should, first of all, be clearly understood what was meant by a mountain-range. The mountains to which Humboldt gave the name of Bolor were, in reality, nothing more than that portion of the elevated mass of land which formed the barrier in Turkistan between the head-waters of the rivers trending west and those trending east. No human being could say to which particular portion of the elevation it physically belonged, because no one knew anything about the Thian Shan, and very little was known about the central portion or the northern portion of the Afghan table-land. His own impression was that the mountains which had been referred to in the paper were rather a prolongation of the Tibetan highlands and the Himalaya. Captain Kostenko had referred to the dry haze observed in one of the valleys of a tributary to the Oxus, as something very peculiar; but every one who had been in the Himalaya knew that it was a very common phenomenon there. Along the whole face of the Himalaya during the dry months a wind blew from the heated plains during the day, bringing with it great quantities of dust, and the haze thereby caused on the tops of the glaciers at an elevation of 10,000 or 11,000 feet was nearly as bad as a London fog. The same winds blew with equal violence along the Valley of the Oxus during the hot months, and he had no doubt a haze was produced there in the same way as in the Himalayas.

Sir George Campbell said he had always understood that the Valley of the Oxus was by no means a rich country, and he was therefore surprised to hear Sir Henry Rawlinson speak of it as a region which the Russians would covet.

Sir H. Rawlinson replied that he did not refer to the immediate banks of the River Oxus, but to the plains on each side watered by the streams descending from the mountains. All the streams running from the Hindu Kush were consumed by irrigation canals in a cultivated region before reaching the Oxus. The district of Kunduz was notoriously rich, as was also Kulm, while Balkh was one of the most fertile districts in Asia, only surpassed by Merv. On the eastern side the Valley of Kulah was exceedingly fertile. Where there were large mountain-streams running down into an alluvial valley, under a tropical sun it was an absolute law of nature that there should be fertility. Sir George Campbell was quite right in saying that the immediate banks of the Oxus were comparatively uncultivated, because the water was all consumed before reaching that river. At the same time the general character of the valley of the Oxus was certainly one favourable to cultivation.

The President, in conclusion, observed that the paper and the discussion to which it had led, proved that with regard to this part of Asia less was positively and scientifically known than almost any other portion of the world. Geographers must, therefore, be very grateful for every modicum of real knowledge that could be obtained. Mere general observation was of very little value when such a confused chaos of mountains was under consideration. He hoped that now, when, by a new convention with China, the road into Central Asia, Mongolia, and Tibet seemed likely to be opened up, the Government would take care that any political mission that was sent in these little-known regions would be accompanied by scientific explorers, who could really obtain trustworthy scientific results, and he thought the Society would be perfectly justified in pressing that consideration as one of great importance.

———:o:———

VIENNA GEOGRAPHICAL SOCIETY.

October 24th, 1876.—Professor von Hochstetter in the chair. The following were elected honorary members:—The King of the Belgians, Baron de Lambermont, Sir Rutherford Alcock, Sir Bartle Frere, H. M. Stanley, Captain Lovett Cameron, and Captain von Schleinitz. The Society, since its last meeting in May, has lost nine members by death, amongst whom are Dr. Ehrenberg, of Berlin, and Dr. P. Forchhammer, of Kiel.

The President announced that the Society had received £100 from its Patron, the Crown Prince Rudolf, to be devoted to the promotion of its objects.

The President then reported on the results of the Geographical Conference, which had taken place at Brussels. The resolutions of the conference were accepted, but the election of an Austrian Committee was deferred until the December meeting.

Dr. Jos. Chavanne read a paper on Central Africa and our knowledge of it, in the course of which he dwelt more particularly upon the discoveries and explorations of Livingstone, Stanley, and Cameron.

———

November 28th, 1876.—Dr. von Hochstetter in the chair. The following are elected honorary members: Captain Nares and Captain Stephenson.

Dr. O. Lenz writes from the Gabun, dated September 12th, 1876, that he had returned from his explorations, and was suffering much from fever and rheumatism. He intended to return to Europe at the earliest opportunity.

The President announced that the Council of the Oriental Museum had been communicated with to join them in establishing a National Society for the explora- of Africa, in connection with the International Association founded at Brussels.

Professor C. Zehden then read a paper on Lake Tahoe, in the Sierra Nevada of California, which he had visited in August last. The lake lies at an elevation of 6300 feet above the level of the sea, and is surrounded by snow-clad mountains, 12,000 to 13,000 feet in height, covered with forests up to a height of 10,000 feet. It is 20 miles long and 10 to 15 miles wide. Its greatest depth is 1645 feet, about 2 miles from the western shore; the depth in its centre does not exceed 1000 feet, and towards the east it is shallower still. Only small rivulets or torrents flow into the lake, which discharges its waters through the Truckee River. Its water is transparent, and a piece of white quartz is visible at a depth of 80 feet. The temperature of the water, even in summer, is very low, and never exceeds 59° F. at the surface. At a depth of 6 feet it is only 43° F., and at a still greater depth 41° F. These temperatures explain the unsuitability of the sea for bathing. The great depth of the lake accounts for its not freezing during winter, although the snow around it is piled up to a height of 26 feet. The lake abounds in fish, and about 175,000 to 200,000 pounds of trout are caught annually. Trout weighing 30 to 36 pounds are by no means rare. The surrounding pine forests are being cut down to supply the mines of Virginia City and other places. Virginia City alone consumes a million cubic feet of lumber annually. At Glenbrook, on the western shore of the lake, there are saw-mills. It is proposed now to conduct the waters of Lake Tahoe to San Francisco and other cities in California. This would require the construction of an aqueduct 250 miles in length, and of a tunnel of 12,000 feet. The cost of this work is not to exceed ten million dollars, and its promoters promise themselves a splendid dividend.

Lieutenant von Becker, who had accompanied Allen Young in the 'Pandora,' rendered an account of their voyage.

———:o:———

BERLIN GEOGRAPHICAL SOCIETY.

December 2nd, 1876.—Baron Richthofen in the chair. Dr. Nachtigal communicated the last letters received from German travellers in Africa, and congratulated the African Association upon the successes achieved hitherto, which compensated its members to some extent for the disappointments and losses they had sustained. Dr. Pogge had announced his arrival at Malange, on the beginning of October, and his approaching return to Europe. His journals and collections are intact, and contain much that is new with reference to a most interesting portion of Africa. Mr. MOHR was at Donde, on October 6th, in perfect health, and fully equipped for the interior. He looked forward to a meeting with Pogge, at Malange, and hoped to be able to profit by that traveller's experience.

Captain VON SCHLEINITZ then continued reading his paper on the scientific work done on board the German frigate 'Gazelle' during a recent voyage round the world.

Dr. COCHINS communicated the results of three and a-half years' scientific travel in Japan.

HAMBURG GEOGRAPHICAL SOCIETY.

December 7th, 1876.—Captain KOLDEWEY read a paper on the results of the English Arctic Expedition. The objects of this expedition had been strictly scientific, and although its promoters were desirous that an effort should be made to attain as high a latitude as possible, they nevertheless did not lose sight of the importance of scientific research. He thought that these objects had been fully attained, and that the results confirmed the arguments adduced in favour of a route through Smith Sound. A higher latitude would have been attained if the coast of Grant's Land, which was found to trend to the west, had extended in the direction of the Pole. The opinion of Arctic navigators, that a coast-line offered the only basis for extending our knowledge of these regions, had been confirmed. Every attempt to cross the pack-ice in sledges, or to navigate the seas lying within its limits, had failed hitherto. The nature of the ice discovered to the north of Robeson Channel, the tidal wave setting towards the south, as well as the geographical distribution of the musk-ox and of other animals, all proved that the Palæocrystic Sea discovered by Captain Nares communicated with the sea to the east of Greenland, and that the latter could not extend much further towards the Pole. He thought it desirable that the exploration of Northern Greenland should be carried on from Robeson Channel not only, but also from the east coast. He regretted that circumstances should have compelled Captain Nares to return after having passed only one winter in these high latitudes, for a prolonged stay might have enabled him to complete the exploration of Northern Greenland. At the same time the results attained were of the utmost importance, and only those could talk about a failure who looked upon the attainment of the North Pole as the only legitimate object of Arctic expeditions. Immediately on his return from East Greenland he had pointed out the absurdity of merely striving to reach the Pole, instead of systematically extending our geographical and scientific knowledge. Greenland, whether approached from the east or through Smith Smith, appeared to him to afford the best basis for future researches, and he trusted that the German flag would be worthily represented in them.

January 4th, 1877.—Dr. KIRCHENPAUER in the chair. Dr. MAX BUCHNER read a paper on New Zealand, the Island of Kandavu (one of the Fiji group), and the Sandwich Islands, which he had visited in 1876. He more especially dwelt on the present condition of the natives of these islands, described the boiling springs of Ohinemutu, in New Zealand, and a visit to the Kilanea, on Hawai.

Dr. NEUMAYER read a paper on explorations in Australia during the last sixteen years.

PARIS GEOGRAPHICAL SOCIETY.

December, 1876.—Baron de LA RONCIERE LE NOURY in the chair. The President opened the meeting by communicating the results of the conference held at Brussels under the presidency of the King of Belgium. France would be represented on the executive committee by M. de Quatrefages, and they were about to form a national committee, which would include men of mark without reference to political opinions. France would be found to be to the fore in this work of science and humanity.

M. MALTE-BRUN, the President of the Executive Committeee, announced that the Society during the past year had had an increase of 200 members.

M. MAUNOIR, the Secretary, read his annual report on the work done by the Society and on the progress of geography generally. The report on the International Congress of Geography was nearly ready for publication. Amongst works referring to historical geography, he referred to A. Himly's *Histoire de la formation des Etats de l'Europe centrale* and E. Desjardin's *Géographie de la Gaule romaine*. Geographical societies had been established at Madrid, Bucharest, Brussels, and Antwerp. Amongst the engineering works now in progress, the St. Gotthard Tunnel and the draining of the Zuyder Zee were particularly interesting to geographers. The various projects for constructing railways in Central Asia were likewise deserving of attention. M. Maunoir then reviewed the principal geographical explorations. Professor Nordenskiöld had established a new commercial high road between Norway and the mouth of the Yenisei, and his work had been supplemented by the explorations conducted at the instance of the Bremen Society for Polar Exploration. The numerous expeditions of the Russians in Central Asia had considerably enlarged our geographical knowledge, as scientific men were frequently attached to the military or diplomatic missions. The English surveyors starting from India were gradually unveiling to us the mysteries of the Pamir and of Tibet. Kambodia had been explored by Dr. Harmand. Passing over to Australia, M. Maunoir referred to the explorations of E. Giles in Western Australia and to the recent expeditions to New Guinea. In Africa, he said, discoveries were keeping pace with all reasonable expectations. M. Masqueray had made important archæological discoveries in the Aures mountains; the levelling of the Tunisian shotts had been completed by Captain Rondaire, and there was no doubt now that an inland lake could be formed to the south-west of Algeria; M. Largeau had returned from Ghadames, and was about to start, with M. Say, for the mysterious region of Ahaggar, not hitherto visited by any European; and M. Bonnat had ascended the Volta river and visited the commercial city of Salaga. MM. Savorgnan, de Brazza, Marche, and Dr. Ballay were still on the Ogowe, and the friendly terms established by them with the Aduma tribe justified us in looking forward to important discoveries. Amongst the numerous *reconnaissances* made at the instance of the Egyptian staff, that of the Mwutan Nzige, by Signor Gessi, was perhaps the most important. Stanley, too, had much enlarged our knowledge of the regions of the Upper Nile, and Cameron had returned to Europe after crossing the whole of Africa, from east to west. Having referred to the explorations carried on in Chili and Peru by M. Ch. Wiener, M. Maunoir referred to the journey of M. Ed. André, from Truxillo to Guayaquil, which had enriched our geographical knowledge in many respects. In conclusion, the English Arctic Expedition was referred to in terms of eulogy.

M. DESIRE CHARNAY, described a journey across the Pampas of the Argentine Republic into Chili, and M. PAQUIER communicated the result of recent explorations in Kashgharia and the Pamir.

In the evening the members dined at the Grand Hotel, Baron de La Ronciere de Noury presiding.

EGYPTIAN GEOGRAPHICAL SOCIETY.

January 5th, 1876.—General E. STONE in the chair. The Secretary, M. Marquis de Compiègne, regretted that Gordon Pasha was not able, on account of his short stay at Cairo, to report personally on his explorations in the regions of the Upper Nile. The financial position of the Society was good, and it would be excellent as soon as the subsidy, so generously granted by the Khedive, was paid to them. Thirty-five members had resigned, and they had to deplore the loss of their associate, Mr. Lucas, who died on his return from Central Africa.

The Secretary then read a paper by M. Dor-Bey, based upon information collected by the late Munzinger-Pasha, with reference to the Sudan. There are few mountain-chains in the Sudan, but granite ridges divide that region into well-defined districts, usually named after the rivers which flow through them. As a rule the country is fertile, with extensive pasture lands and a luxuriant vegetation. The watercourses as a rule are mere torrents, almost dry during summer. There are few great centres of population, and all the large towns are on the banks of the two Niles. Gold and copper are found, but the wealth of the country depends upon agriculture and the breeding of cattle. The population, consisting of Arabs and Negroes, may be estimated at five millions, of whom about a fourth are whites. Arabic is the dominant language, and is spoken with great purity. Tigre and Bedaiwa are also spoken extensively, and there are numerous dialects, including that spoken by the Barabras. The inhabitants are not distinguished by any striking features, and the history of the country is obscure. The population may be divided into two great classes, the tillers of the soil, who live in huts, and the nomads. The Arab peasants build themselves houses of stone or bricks. The Muhammadan religion is that of the great majority, but it is mixed with numerous superstitions. Agriculture is carried on in a very primitive fashion. Durra, sesam, cotton, &c., are cultivated: wheat only grows as far as Berber and in Asaba. Industry is very much developed, and only articles of luxury need be imported. Stuffs, sword-blades, and leather of a very superior quality are manufactured, and all along the rivers barges are built in large numbers. The principal exports consist of gums, ivory, skins, &c. There is a considerable transit trade with Dar-Fur and Abyssinia. The Egyptian Sudan is divided into seven provinces or Mudirichs, placed under a Governor-General residing at Khartum. The revenue amounts to £340,000, and is derived mostly from indirect taxes.

Colonel Mason read a paper descriptive of Dar-Fur. The country is inhabited by Negroes and, in the north, by Arabs, who are famous as camel-breeders, hunt ostriches and gazelles, and steal the cattle of their neighbours. Agriculture is at a low ebb, but industry has made considerable progress, the woollen and cotton stuffs sufficing for the wants of the population. The manufacture of metals, more especially, is deserving praise.

M. Abbate-Bey hoped that the collection of minerals and vegetables made by officers of the staff would be exhibited, and General Stone promised that samples should be furnished to the Society.

———:o:———

ITALIAN GEOGRAPHICAL SOCIETY.

December 4th, 1876.—Commendatore Correnti in the chair. Amongst those present were H.R.H. Prince Humbert, several ministers of state and members of parliament. The President furnished the latest information which had been received from the Marchese Antinori, then dwelling in Africa; he drew the attention of the members to the Brussels Conference, and announced that Prince Humbert had consented to place himself at the head of an Italian National Committee.

Signor Adamoli then read a paper on his travels in Morocco, which was listened to with rapt attention. In comparing the coast towns, with their European residents, and the towns in the interior of the country, he pointed out the superiority of the physical and moral condition of the inhabitants of the latter. Morocco held out many inducements to explorers not only, but also to merchants. He expressed a hope that Italians would establish themselves there, in order that they might share in the profits to be derived from the Sudan trade, which France vainly sought to attach to Algeria. He contrasted the Mussulmans of Morocco with those of the extreme East. The latter were undoubtedly most advanced in civilisation. There existed, no doubt, many points of contact between the two, but these, in his opinion, did not constitute solidarity in politics. The Moors, he felt certain, would never render effectual assistance to the Turks, and if the prophecy of a saint of Safi could be relied upon, Mussulman rule would cease to exist in the thirteenth century of the Hegira. In conclusion, Signor Adamoli pointed out the best means for penetrating into the interior of the country.

POSTSCRIPT.

PROPOSED AMERICAN ARCTIC EXPEDITION.

After going to press, we received, through the courtesy of Dr. Petermann, the following Bill, which was brought into the House of Representatives of the United States on January 8th, 1877:

Read twice, referred to the Committee on Naval Affairs, and ordered to be printed.

Mr. Hunter, on leave, introduced the following bill:

A BILL

To authorise and equip an expedition to the Arctic Seas.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the President of the United States be authorised to organise and send out one or more expeditions toward the North Pole, and to establish a temporary colony, for purposes of exploration, at some point north of the eighty-first degree of north latitude, on or near the shore of Lady Franklin Bay; to detail such officers or other persons of the public service to take part in the same as may be necessary, and to use any public vessel that may be suitable for the purpose; the scientific operations of the expedition to be prosecuted in accordance with the advice of the National Academy of Science; and that the sum of fifty thousand dollars, or such part thereof as may be necessary, be hereby appropriated out of any moneys in the Treasury not otherwise appropriated, to be expended under the direction of the President: Provided, that no part of the sum so appropriated shall be carried to the surplus fund, or covered into the Treasury until the purpose of the appropriation shall have been completed, but may be applied to expenses of said expedition incurred during any subsequent year that said expedition may be engaged in its duties.

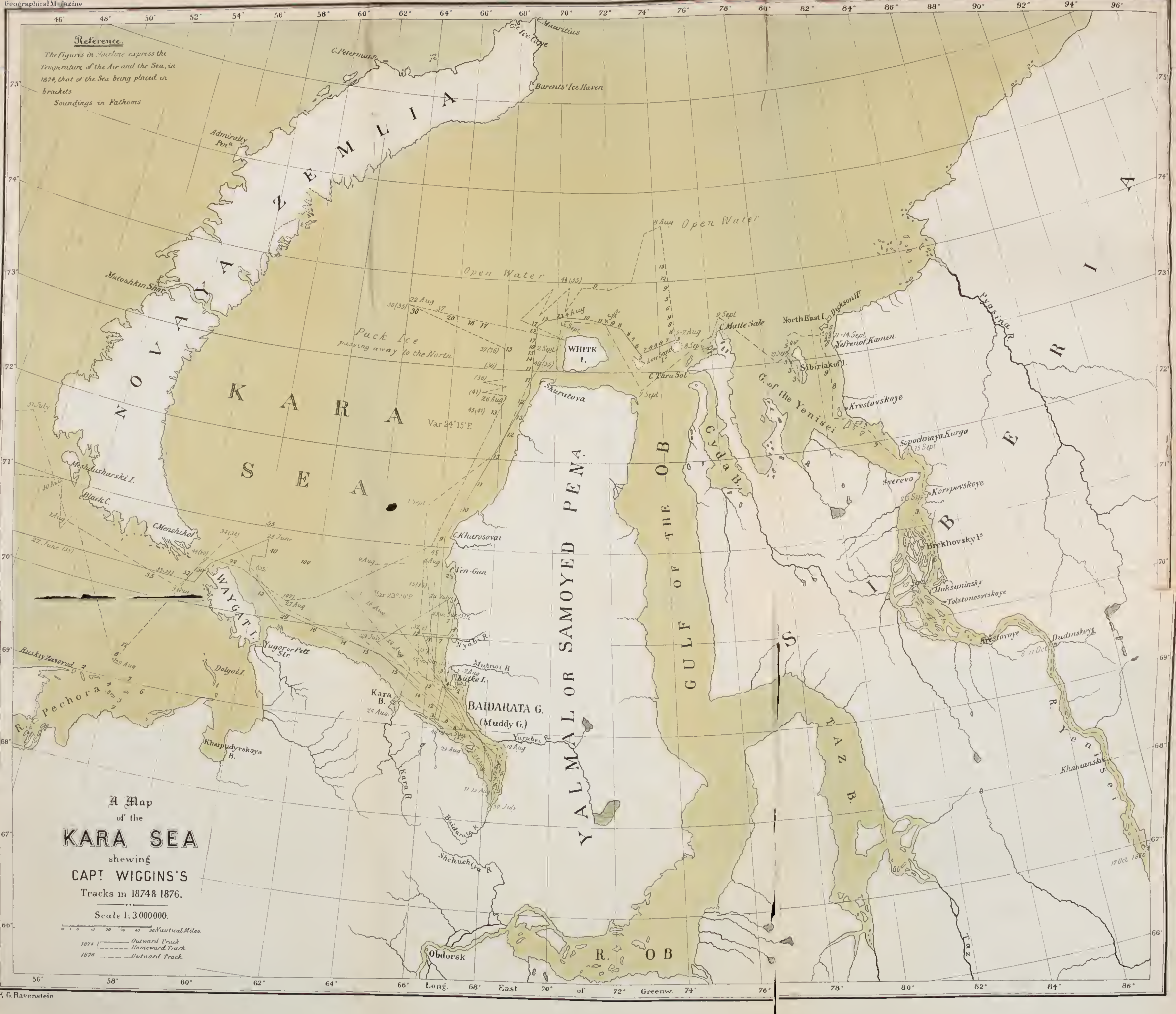
NOTICE.

The Office of The Geographical Magazine *is at* 57 & 59, *Ludgate Hill, E.C.*

Manuscripts sent to the Editor cannot be returned, nor can the Editor be responsible for them.

The right of translation is reserved.

Annual Subscription and Postage, £1, *Inland. Foreign Orders must be accompanied by P.O.O. or Cheques to include the full amount of Foreign Postage. Post Office Orders to be made payable to Messrs. Trübner & Co.,* 57 & 59, *Ludgate Hill, London, E.C.*



A Map
of the
KARA SEA
shewing
CAPT. WIGGINS'S
Tracks in 1874 & 1876.

Scale 1: 3.000000.

E. G. Ravenstein

THE

GEOGRAPHICAL MAGAZINE.

MARCH, 1877.

COMMUNICATION WITH SIBERIA BY SEA.

Few will deny that our great development of commerce is principally, if not entirely, due to geographical discovery, for wherever new countries of a productive character are found out, commerce and trade are sure to follow, and, what is undoubtedly most important of all, the work of civilisation is advanced. The road to success in science is by experiment, perseverance, and unwearied exertion. Pretty much the same is the path for the geographical explorer, who in addition is called on to bear greater hardships, physical and mental, and run greater risks; but it is pleasing to note that the results in both these departments of inquiry are ultimately for the benefit and elevation of humanity.

For many years I have been impressed with the idea that commerce to an immense extent could be carried on between Siberia and Western Europe *viâ* the Kara Sea, and the mighty rivers Ob and Yenisei. These rivers penetrate some 2500 miles into the heart of Siberia and to the confines of China; a high road even to Japan could be opened by Lake Baikal and the Rivers Selenga and Amur, where trade by water transit is already carried on to a large extent by Russia. By the Kara Sea route, the mineral wealth on the slopes of the vast Ural Mountains, the produce of the immense forests and agricultural districts of Central and Southern Siberia, together with the valuable fur and fish trade of Northern Siberia, could be turned into the channel in question, which is but some twelve days' steaming from England, or similar to an Archangel voyage. There could not be the slightest doubt of the importance of this route, and my idea was strengthened by the fact that, some three centuries ago, such famous heroes and explorers as Sir Hugh Willoughby, Chancellor, and Petts, and the brave Dutch Captain Barents, attempted to demonstrate the problem of finding their way to Japan by the north-eastern route inside the Kara Sea. At this period the Russians were and had been for many years engaged in an extensive trade from Archangel to the Ob and Yenisei *viâ* the Kara Sea. This was accomplished by wretched flat-bottomed boats, sewn together with willow twigs, called kotchkies; and under these difficulties they skirted the Samoyede land or southern coast of the Kara Sea, passing in through the Waygat and Pett Straits, thence crossing the Biadarata Gulf to the River Yurubei, proceeding up that river until they came to two lakes, which were reported to nearly join the River Selenoi, which river was said to enter the Gulf of Ob near the Gulf of Taz, where a large town by the name of Mangasee existed. Occasionally these frail craft were known even to reach and ascend the Yenisei. What might not be done, therefore, with our improved steamers of the present day? They now annually do battle with the mighty ice of Davis Straits, Smith's Sound, &c., in comparative safety.

No modern expedition, to my knowledge, had ever reached the Ob and Yenisei by this Kara Sea route; nevertheless, as I was on the point of sailing, I received information from Dr. Petermann, of Gotha, that on several occasions for a few years past Norwegian vessels of very frail construction were in the habit of resorting to these seas for walrus and seal hunting, and that Capt. Carlsen had actually succeeded in circumnavigating Novaya Zemlya; and he further reported that the merchants of the Rivers Yenisei and Ob were quite alive to the importance of the route, inasmuch as a merchant named Siderof had offered £2000 to the first vessel that should communicate with the Ob and Yenisei. His offer, as far as I know, had never been accepted, and perhaps this is not surprising, because high authorities in Arctic matters, whom I often consulted, were anything but sanguine on the matter. It is true that some few agreed that it might be possible to communicate with those rivers, but a great number deemed the ice an insuperable difficulty. I was also warned that the Russian Government was not in favour of commerce being carried on by that route, owing to the fact that the land was one of exile.

As to the fear about the ice, I believed it would not prove so formidable, and for this reason: the warm waters of the Gulf Stream and equatorial currents which were known to pass round the North Cape on towards Novaya Zemlya would in all probability find their way into the Kara Sea by the Waygat and Pett Straits, and thus meeting and driving the ice before it to the northward, would cause at least the southern part of the Kara Sea to be open for several months in the year; and it will be seen hereafter that my views on this point were correct.

With regard to the difficulty about the Russian Government, I felt sure if it became convinced that commerce could be carried on by this route, enriching so valuable a tract of country as Eastern Siberia, it could soon discover other means of disposing of its exile population by removing them further eastward into the vast regions of Eastern Siberia, if necessary.

Apparently the most valid argument against the scheme related to the ice, but, as experience has shown, this does not amount to much, the Kara Sea being open as long on an average as the Hudson's Bay is to the westward; and I may here say that to me it seems a mournful fact that such a vast commerce should lie dormant for want of ordinary enterprise. To the north-westward, the Hudson's Bay Company trade successfully for some two or three months every summer in quite as unfavourable districts as these, and it pays them well to keep up at an enormous expense, in these territories, ports, stores, staffs of superintendents, and servants, &c., and a fleet of most expensive "Arctic" or ice steamers to do battle with the dread ice of those regions, and this only for one kind of commerce, viz., the fur trade; whilst the Kara Sea route combines with this all other kinds of trading, together with a grand market outwards for our own manufactured goods.

I may state, for the benefit of those who may be sceptical as to the prospects of this "mighty commerce," that the fur trade is one which will vie with any other part of the world. Then the rivers are one living mass of fish; and the art of fishing in this quarter is not to secure as great a "haul" at a time as possible, but rather how best to avoid this, from the fact that one-third of the nets are lost annually by the heavy draughts of fishes. The fish are of the richest quality, and consist of sturgeon, salmon, stirlet, pike, perch, bream, a splendid quality of herring, and many other of the most valuable kinds, only known to me by their Russian names.

Then there are other valuable commodities. The Ob, which skirts the eastern side of the Urals, is exceedingly rich in minerals, while the Yenisei has its gold, silver, iron, and copper mines. There is also graphite and other minerals. The forests are magnificent, and there are immense tracts of agricultural land, which, in the event of extended commerce, could supply all Western Europe with wheat, linseed, oats, barley and other cereals. The basin of the Ob especially is of the richest kind, owing to the fact of its overflowing its banks annually, and leaving a rich deposit in the same manner as the Nile. I may also state that my late overland journey from the Yenisei has made me aware of the fact that the people in these regions want every kind of manufactured article that can be procured from our country, and that in such large cities as Irkutsk, Tomsk, Omsk, Tumien, &c., where there are many of the wealthiest of gold merchants, and others, the demand for such luxuries would be great.

Goods from Europe, and teas, &c., from China, are now being transported by the tedious and most expensive overland route. It costs on an average from Moscow to such a place as Irkutsk as much as £20 a ton—a price which is almost sufficient to prohibit trade, except to the wealthier classes. By the new route raw produce could be transported at the rate of one-fifth this amount, and at the same time affording handsome profits.

Before going further, it may be as well for me to corroborate these statements as to the productiveness of this part of our globe by quoting from a paper, entitled "The Riches of Siberia," read at the Congress of the Geographical Sciences, held at Paris, August 5, 1875, by M. F. de Lesseps. "This country" (Siberia), he said, "the richest of the entire world under the triple produce of the vegetable, mineral, and animal kingdoms, divides itself politically, as you know, into two great parts—West Siberia and East Siberia; and geographically it is divided from the north to the south into three great regions—the regions of wheat, of forests, and of fishing and hunting. The mineral kingdom extends over all these regions, which are hardly cultivated. To draw means from all the riches and all these products yet buried in the ground or swamps lying in these regions where they are so cheap, where workmanship is almost for nothing; to bring all this untold wealth into relation with Europe and the entire world has been for a number of years the aim of the Government and of hardy and stubborn explorers, and for which they laboured with an energy worthy of the undertaking. Nature makes no mistakes, and everywhere offers to enlightened human intelligence the true means for such as are able to discover them. It is from the south to the north that flow the numerous and magnificent rivers, to which only those of South America can be compared, by which all Siberia is furrowed, forming a vast fan which widens in the interior of the country to the great advantage of her vegetation and her inland commerce. Throughout the whole length of the eastern declivity of the Urals, we have her magnificent pendant the 'Ob,' which, with her confluent the 'Irtish,' forms an immense stream of navigable water as far as China. The only problem to be solved, in order to direct the commerce of the aforesaid regions of Siberia into Europe by the natural ways of that country and Northern Russia, is therefore to find a direct way of communication by sea."

In the summer of 1874 I determined to test the correctness of my views by this new route. Accordingly I hired the Arctic steamer 'Diana,' and sailed from Dundee on June 3rd. On the 27th of the same month we passed the Waygat Straits, or the dreaded "Iron Gates" as they are called, sailed along the southern shore of the Kara Sea or Samoyede Land in from 10 to 11 fathoms of water, there being no ice to impede our progress under sail alone, never having needed the use of steam from leaving the vicinity of Hammerfest. We spent several weeks in the neighbourhood of Lütke Island and Baidarata Gulf, cruising about with the greatest ease and safety. Landing occasionally, we found the earth one mass of green foliage and flowers, sweet berries of many kinds, eider down, and immense flocks of the eider duck, together with swans and geese on the small inland lakes. No snow was to be seen, except on the highest peaks of the Ural Mountains. From thence, as soon as the ice had passed away from the middle of the Kara Sea, we proceeded to the northward along the Yalmal coast, round by White Island, to the Gulf of Ob, where we arrived on the 5th August. Here we experienced strong head-gales and currents, and my steamer being slow of speed, and great draught of water, I determined after beating about for several days, and the gales not abating, to abandon the attempt of ascending the river with such a vessel, more especially as I had promised, if circumstances permitted, to search for the Austrian Expedition. I therefore, after a short cruise further north, and convincing myself that far beyond all was open water, proceeded south again, passing out through the Waygat Straits, arriving on the west coast of Novaya Zemlya by the 30th of August, to find that the Austrians had been relieved by a Russian schooner a few days previous. I then made for Hammerfest, where we had the extreme pleasure of meeting the Austrian Expedition. From this port I immediately telegraphed the news that we had sailed the Kara Sea for eight weeks, having reached the Gulf of Ob, and found all open water between it and the Yenisei, and that we could have ascended these rivers had circumstances permitted.

We arrived by the 26th of September at Dundee, where I paid my crew off, and during the winter I gave lectures in several provincial towns, descriptive of my voyage, pointing out the feasibility of this route and its great importance to commerce, appealing to the public to assist me to carry out my ideas, by either forming a company to trade at once or to accomplish the work in any other way. The result of this was that two gentlemen of Sunderland rendered me material aid to fit out another expedition, as I was somewhat crippled in my own resources, having undertaken the first voyage entirely at my own expense.

I purchased a small cutter of not more than 45 feet long, and sailed in this tiny craft direct for the Kara Sea; heavy head-gales and other circumstances, however, prevented me reaching further than Kolgueve Island; north-east gales, increasing in force almost to the verge of a hurricane, compelled me reluctantly to bear up for home in the latter part of August. After a severe passage we arrived safely at the port of Sunderland in the latter part of October, to learn that Professor Nordenskiold, of Stockholm, who following on my track of last year, believing as he did in the theories advanced by me, succeeded in reaching the mouth of the Yenisei with a Norwegian sloop, and had ascended the river in a boat, despatching the vessel back to Norway. On the Professor's return overland to St. Petersburg, I was invited by the merchant Sideroff and the different societies of that city to meet him there. The professor and myself addressed the members of the Societies for the Encouragement of Commerce, &c., and large audiences. The excitement and interest then manifested created a desire for the continuation of these explorations; merchants from the different cities in Siberia, Moscow and St. Petersburg offered to subscribe funds for an expedition under my command. The wealthy gold-mine owner, Alexander Sibiriakof, who had given £3000 towards Nordenskiold's expedition, subscribed £1000 towards mine, and Mr. Gardiner, of this country, subscribed a like sum. I was commissioned by the Imperial Societies for the Encouragement of Commerce and for the Development of Marine Communications to return at once to England and secure a steamer suitable for the work, and they would forward the means. However, before this could be accomplished, jealousies had invaded the Societies, there being members averse to the "foreign element," and desirous that a Russian naval officer should head the expedition. This had the unfortunate effect of causing promised subscriptions to be withheld, M. Sibiriakof being the only gentleman who remained steadfast to his proposal. His money was placed in the hands of the editor of *The Times*. This, coupled with the assistance of Mr. Gardiner, enabled me once more to attempt demonstrating the feasibility of the route. I therefore purchased the screw-steamer 'Thames, which vessel was strengthened and fitted for Arctic work, and although very inadequate, being of little power and not at all suitable for the undertaking, I managed to fit her out and provision her for about six months. With this vessel I succeeded in freely navigating the Kara Sea for some six weeks, surveying thoroughly the Baidarata Gulf, where I found a commodious harbour under an island on the west shore. I then proceeded to the Gulf of Ob, where heavy gales and strong currents again prevented me from ascending, my vessel having the same drawbacks as the 'Diana,' namely, slow of speed and great draught of water.

During my stay in the Kara Sea, both in 1874 and this last voyage, I succeeded in thoroughly demonstrating the fact that the Gulf Stream and equatorial currents positively flow into this sea. The following temperatures will show this:—5th July, latitude 69° 25′ N.; longitude, 66° 35′; temperature of the air in the shade, 45; ditto in the sun, 65; water surface, 38; density, 4. 11th July, off Lütke Island, temperature of the air in the shade, 37; ditto in the sun, 67; surface of water, 35; density, 4. 23rd July, latitude, 70° 10′ N; longitude, 66° east, lying in the pack ice; temperature of air in the shade, 45; surface of water, 37; density, $1\frac{1}{2}$. 25th July, same latitude and longitude, still lying in the ice; temperature of air in the shade, 55; water surface, 37; density, $1\frac{1}{2}$. 27th August, latitude, 69° 54′ N.; longitude, 65° 10′; temperature of air in the shade, 50; water surface, 47; density, 5. 28th August, Waygat Straits; temperature of the surface water, 50°; density, 4; air, 45 in the shade. 30th August, latitude, 70° 24′ N.; longitude, 48° east; temperature of water surface, 43; density, 5; temperature of air, 43. 31st August, latitude, 70° 30′ N.; longitude, 44° 10′ E.; temperature of the air, 43; water, 43; density, $5\frac{1}{2}$. These two last observations, it will be seen, are far to the westward in the northern seas, and actually demonstrate that the Waygat Straits is warmer by two degrees. During my last cruise, in 1875, I may quote the following from a list of observations:—2nd August, Waygat Straits; temperature of the air in shade, 48; water suface, 50; specific gravity, 25. 3rd August, latitude, 70° N.; longitude, 61° 58′ E.; temperature of the air, 58 in shade; temperature of water at surface, $48\frac{1}{2}$; density, 20; 9th August, latitude, 68° 50′ N.; longitude, 67° 40′ E.; temperature of air in the shade, 55; in the sun, 90; water at surface, 48; density, 20. 27th August, latitude, 69° 42′ N.; longitude, 68° 30′ E.; air in the shade, 60; water at the surface, 49; density, 17.* These high temperatures must be a convincing proof that the Kara Sea receives the heat of the Gulf Stream and equatorial currents. Over the same latitudes in Davis Straits and East Greenland, the water is never beyond the temperature of 1 or 2 degrees above freezing point or + 33 to + 34 at the same season of the year.†

During the whole of my last cruise I succeeded in dredging with great success, but I was compelled to leave these materials and specimens on board my ship, they being too bulky for transport overland in sledges.

---

* These temperatures were taken with Board of Trade tested thermometers.

† See Markham's *Whaling Cruise to Baffin's Bay.*

I made frequent observations for determining the variation of the compass, and found it to increase rapidly to the eastward as we sailed northward in the Kara Sea. Towards the entrance of the Yenisei it proved to be nearly $2\frac{3}{4}$ points E. The crew landed at several of the islands and found the earth covered with rich foliage and flowers, the same conditions as were found in 1874. The Gulf of Baidarata was then thoroughly surveyed, searching with the screw-launch for any small rivers that might lead across the Isthmus of Yalmal to the Gulf of Ob. On the west side I found an excellent harbour under the shelter of an island, which I named Gardiner's Haven, and the island I named "Siberiakof Island."

On September 2nd the vessel arrived off White Island, the entrance of the Gulf of Ob, having proceeded there under canvas without the aid of steam, *no ice* impeding my progress. However, heavy headgales prevented me from ascending this gulf, therefore I bore up for the Yenisei, discovering on my route throughout many magnificent islands well clad with verdure and abounding with reindeer. While among these islands I on one occasion took shelter for upwards of five days, hurricanes of wind prevailing the whole time, the ship riding in perfect safety in the smoothest water. From thence I directed my course to the Yenisei, passing on my way magnificent islands containing natural harbours of the most extensive kind, and reindeer in large numbers were to be seen. On the shores of most of these islands driftwood was piled up in monster heaps which contained trees of the largest dimensions, some of which would make masts for the largest of our men-of-war. Most of them were as sound as the day they were lodged there, owing to the preserving power of the climate; and there is no doubt that most of these splendid spars have been lying there for centuries.

A fine northerly gale soon brought us into the vicinity of the first village at the entrance of the Yenisei, which forms a well-sheltered natural harbour for vessels loading in the summer months. I landed here expecting to find records of the merchant Sideroff's vessel that was expected at the mouth of the river with plumbago. On reaching the village I found the few houses composing it roofless and deserted, and observed large troughs lying about, which evidently had been used in the preparation of seal and walrus oil obtained by Russian fishermen in times gone by. The boiling house was in the rear of the building and the best preserved of all. Many foxes were wandering at their leisure on the beach. I should not omit to mention the difficulty we encountered in scaling these formidable barriers of drift wood to reach this village from the beach. Many of these great balks of timber, had never received the pressure of human feet for centuries, and on our stepping on to them several of them that were buried far below, being rotten, gave way, precipitating the surface timber, and the members of the party, who stood in great danger of being buried alive. Finding no records, I advanced up the Yenisei, and the first natives I had the pleasure of holding communication with were found in the village of Sverevo. Here a Russian and two Samoyedes came on board; I interrogated them as to their knowledge of the Swedish expedition, which I expected had ascended some time before. They appeared entirely ignorant of any such having passed up. From here I crossed over to the village of Korepovskoye. The natives of this village informed us that Professor Nordenskiold had not been there—volunteering at the same time to pilot my vessel to Dudinskoe.

After many days of hard labour to discover the channels, I was obliged to dispense with the services of this native, and then, by the aid of my steam-launch, succeeded in finding the only channel in this locality, which was never less than some 3 fathoms deep, and not over half a mile in length. Once over this difficulty, I sailed with the greatest of ease to Dudinskoe, finding the channel good all the way up, never having less than 5 or 6 fathoms of water. Ascertaining that the nearest port or river of safety in connection with the Yenisei was at Kureika, and that by placing the vessel within the entrance of this small river she would be in perfect safety until the breaking up and finally passing away of the ice in the spring, I determined to take my vessel there, and succeeded in reaching the entrance of this river by the 17th of October, and having entered it as far as the water (which was very low) would permit, I succeeded in placing my vessel alongside the bank of the river, and the following two or three days served to fasten her in this position, the ice having formed. The crew being comfortably housed on shore, and Captain Svanberg, who had been sent out to work the plumbago by M. Siderof, having joined me, we left the ship on the 24th of November, and proceeded in sledges to Turuchansk. Here the governor of the village, an over-officious official, committed himself by behaving in a most violent manner towards our party. He seized our sample goods, on the pretence that I had infringed the laws of Russia by giving away on several occasions small articles as presents to those natives who had been so kind to me on my way up the Yenisei. This foolish man proceeded to such an unwarrantable extreme as to threaten Captain Svanberg with imprisonment, or to despatch us to Yeniseisk under an escort of soldiers. Ultimately he became convinced that he was acting improperly, changed his conduct, invited us to dinner, and finally did us the honour of escorting us himself to the next village.

Our journey to Yeniseisk, a distance of 600 miles or more, was resumed. The scenery was occasionally grand in the extreme, and at times we passed through magnificent forests of immense trees, consisting of the fir, the birch, the plane, the cedar, &c. The weather continued clear and beautiful, although intensely cold, the thermometer registering at times 40° below zero. Arriving at Yeniseisk by the middle of December, telegrams were immediately dispatched to England and other places announcing our safe arrival. At this port the *spravnick* or governor, the mayor, merchants, and other inhabitants received me with the utmost kindness and hospitality. On no less than three occasions was I entertained at private *soirées*. The Governor-General of Siberia, having been communicated with, sent orders for the immediate release of the goods, *free of all duty*, which had been detained at Turuchansk, and finally another officer was dispatched to relieve the before-mentioned official in that district of his responsible duties, thus proving that the Russian Government do not wish in any way to impede commerce, but rather to facilitate it in every way. I also received from the Mayor of St. Petersburg a complimentary telegram, in the name of the Imperial Societies of that city, congratulating me on my success.

Yeniseisk I found to be a town of very great importance, containing upwards of 11,000 inhabitants, many of whom are merchants of the wealthiest class. The town had an exceedingly fine appearance; amongst its many well-built houses were to be seen several large churches with their gilded domes and cupolas, in the true Oriental or Byzantine style of architecture. An extensive trade is carried on at this town in the exchange of goods, consisting of wheat, barley, oats, hides, tallow, teas from China, and many other commodities. Owners of gold mines are also to be found here luxuriating in almost palatial residences. The mixed population consists of the Russian proper, Germans, Poles, Tatars, Jews, and only one Englishman, who had resided in this town upwards of 30 years. This gentleman, Mr. Boiling, is the only shipbuilder on that river, he having built the schooner for Mr. Sideroff's expedition of last summer. The gold mines of these districts are both rich, extensive, and numerous. There are also copper and iron mines.

Leaving here I journeyed on to Krasynoarsk, where I received a hearty reception from the Governor, who rendered me all the aid in his power, furnishing me with a government padarojina or pass for engaging horses on the road. This government pass constituted me a courier, who took precedence of everything on the road, even the mail, the consequence being that I was forwarded with the utmost despatch, travelling night and day, only stopping for a single night at such towns as Omsk, Tomsk, and Tumein. At Omsk the Governor-General of Western Siberia received me in the most hospitable manner, entertaining me to dinner, and giving me the most valuable information concerning the Ob and its estuary, and the mode of transit of the immense commerce of that district. He authenticated in every way the reports of the richness and wealth of the country, and expressed the most earnest desire that I would not allow my energies to flag in the endeavour to open out such magnificent rivers as the Ob and the Yenisei.

Pushing forward I reached Tumein, the principal city for shipping on the Ob. Here I found the spirit of progress in full operation. On the river were to be observed steamers of the largest dimensions, being nearly 300 feet in length and of 300-horse power, built and finished in a good style, with modern engines constructed principally by the English firm of Wardrapper Bros. I also observed splendid lighters of between 200 and 300 feet in length, and capable of carrying upwards of 500 to 600 tons of cargo, at the same time drawing not more than 3 feet of water. On the shore, at the different shipyards, many were to be seen in various stages of progress.

Proceeding night and day *viâ* the Ekaterinburg Pass of the Ural Mountains, ascending the eastern slopes on the last day of the old year, and descending the western side on the morning of the new year—thus leaving the Ural and the old year behind together—soon I found myself at Nishninovgorod, where I took train to St. Petersburg. At Moscow I was well received by the President, Count Camarovski, the Vice-President, Mr. Trapeznikoff, and the Secretary, Mr. Waldemar, of the Imperial Society for Marine Communications. These gentlemen also gave me much valuable information. This Society is now organising a steam expedition to sail from some European port next summer with the intention of exploring the Gulf of Ob as far as Obdorsk.

On my arrival in St. Petersburg the Imperial Socities of Commerce and of Marine Communications requested me to read papers upon the experiences of my voyage and the future prospects of commerce with Siberia. Having complied with these requests, I was presented by each Society with a life membership and a chart of the locality of my explorations, handsomely bound in morocco and gold, together with a letter of thanks from each society. After a fortnight's sojourn at St. Petersburg, I started for home, arriving in London on January 31st. Before I return to Siberia I hope to create sufficient interest amongst our men of science and commerce to despatch at least one steamer to the Yenisei this summer. As a proof of the openness of this sea, I need only mention that Professor Nordenskiold proceeded with the greatest of ease to the entrance of the Yenisei and landed a portion of his cargo at the entrance of the village of Korepovskoye, staying eighteen days there, and then returned direct to Stockholm. Mr. Gardiner, has, with his steam-yacht the 'Glow-worm,' proceeded without any impediment direct into the Kara Sea *viâ* the Matochkin Shaar, sailing northwards to the vicinity of Barents' wintering quarters of three centuries ago, recovering many of the most interesting relics connected with that expedition. From thence he sailed to the northernmost part of Novaya Zemlya, returning again down the east coast to the southern shores of the Kara Sea, crossing to the vicinity of Lütke Island, passing northward along the Yalmal coast, and to within a few miles of White Island. Having expended nearly all his coals, Mr. Gardiner then steered south, direct across the sea, passing out by Pett Straits.

I have obtained a very fine collection of botanical specimens from the vicinity of the Yenisei, as well as specimens of ermine and other furs, which are pronounced by competent judges to be of the finest by the natives, who stated that there was abundance quality. Mammoth tusks were also presented to me to be found in the deserts or tundras adjoining the districts of this river. These voyages, and our ascent of the Yenisei with the first European steamer and cargo that has ever reached so far into those regions in the annals of history, should surely be a convincing proof of the feasibility of this route for commerce. It may even yet prove to be the best route to the Pole, seeing that it is more than probable the warm waters of these mighty rivers will, after joining the salter waters of the Kara Sea, pass on to the north-eastward, round towards the open water as seen by Baron von Wrangel. Smith Sound route to the north-west having been investigated, it is to be hoped that our next Polar Expedition will turn its attention to this north eastern route.

Joseph Wiggins, F.R.G.S.

THE WORKS ON THE TIBER.

From the earliest periods of Roman history to the present day the question of how to protect Rome from the inundations of Father Tiber has occupied kings, consuls, dictators, emperors, pontiffs, as it now occupies the state, provincial and municipal councils of the capital of united Italy; and for more than twenty centuries he has defied one and all, and all with impartial audacity,

> "To teach his feet a measure,
> And find his mouth a rein."

Small blame, therefore, must be attached to the authorities who have ruled in Rome since 1870, if it has taken their best engineers six years to survey, choose one from the numerous projects submitted to them, and send in the probable estimates. It is to their credit, we think, that even now, in supporting the very modest project finally adopted, they say: "The works we propose are absolutely necessary and certainly harmless: they may suffice; if they do not, the experience gained during their execution will indicate the next step to be taken: we cannot conscientiously pledge ourselves to support any special project of rectifications or deviations until this first series be completed."

More than eighty inundations of the city of Rome are registered from its foundation to the present time, and despite all the efforts made to impede or diminish their force, there is fair presumptive evidence that this last flood of 1870 was the fourth on the list for magnitude and violence, being surpassed only by those of 1598, 1606, and 1637.

We say presumptive evidence, because only from 1378 has the height to which the waters rose, in certain portions of the city, been inscribed on tablets at the Minerva, and later at the Hydrometer of Ripetta. The first of these tablets was ordered by Urban VI., "8 November, 1378, 10 palms at the Minerva," but modern researches have failed to discover to what level of the river the ancient records refer.

As to the inundations previous to 1378, we have but vague indications of their magnitude, though it is certain that the havoc and desolation was great. The first flood mentioned by Livy "was witnessed by the consuls Gneo Genuzio and Emilio Mamerco, in 390 B.C."

In the year 2 B.C. (732 Roman era), the Ponte Sublicius was carried away; rebuilt by Nero 56 A.D., and was again destroyed in 69. In 119, under the Emperor Hadrian, it was feared that the entire city would be submerged. In 576 the waters covered the walls of the city, and in 717 the flood lasted seven days, covered the walls of the city, which was navigable from Ponte Molle to the church of St. Peter's, and in Via Lata the waters rose higher than two tall men!

All these vague records throw little light on the question of paramount importance, "What is the maximum height to which the waters have risen in the past?" to which question the answer must be found before it can be decided what are the defences necessary to provide against a recurrence of the catastrophe in the future. One of the chief "projectors" of the present day, the engineer, Sig. Canevari, whose plan substantially is accepted, opines that it suffices to provide against such a flood as that of 1870. His opponents point to the three previous ones, proved to have been greater, and to the great flood of 725 when in Via Lata the waters rose higher than two statures. But, replies Canevari, in order to avail ourselves of the few notions handed down to us touching the inundations, we must bear in mind the topographical conditions of ancient Rome. In the first place there were seven bridges, all with ogival arches; seven dams instead of four, as we have to-day, preventing the downflow of waters in time of floods. Again, the level of the city was generally much lower than at present. To take the case in point. During certain excavations in Piazza Sciarra, the pavements of houses were found 7½ metres below the actual level, and there was the *Via Lata*. The pavement of the church of St. Mark is 2 metres below the level of the Piazza di Venezia; another entire street, paved with octagonal blocks of basalt, exists at 9 metres below the present level! Livy says that the Tiber flooded Campio Marzio and the plains at the foot of the Capitoline and Palatine Hills. But it must be borne in mind that the valleys between these hills were mere swamps, their level much lower than at present, even as the sub-arch of the Cloaca Massima proves how depressed was the plain of the Velatro. In short, Sig. Canevari concludes that nothing in the records of ancient inundations indicates that they were more serious or higher than those that have occurred within the memory of present generations.

Be this as it may, the efforts made in successive ages prove the magnitude of the evil; also, that there is nothing new under the sun, and that hydraulics have made small progress as compared with other sciences.

The Etruscans seem to have been the first to excavate a channel to receive the surplus waters of the Tiber, whose source is Mount Coronaro near Mount Falterona, whence the Arno flows. Some writers attribute this new channel to the work of man, others to nature. Ancient geographers affirm that all the waters of the Upper Arno were originally discharged through the Val di Chiana into the Tiber by its tributary stream the Paglia, whose bed at the southern extremity of the Val di Chiana had about the same level as the Arno: but whether the depression of the bed of the Arno, and the raising of that of the valley by the deposits of the lateral torrents, finally cut off the branch which had flowed into the Tiber, or whether the channel was really cut, these supplies were deviated shortly after the building of the city of Rome. The Cloaca Massima was constructed by Tarquinius Priscus between the Velabrum and the Tiber to carry off the waters of the two branches of the former river which wound round the Palatine, the Aventine and the Capitoline hills; and this subterranean canal, while draining the marshes between the hills, and serving as a great common sewer for the city, considerably increased the volume of the Tiber's urban waters. A proof of the rise of the level in the bed of the Tiber consists in the fact that the channel, which had originally a considerable fall, has been choked up to more than two-fifths of its original height.

Julius Cæsar, 59 B.C., formed the gigantic project of deviating both the Tiber and its chief tributary the Arno, bringing each river down in a straight line to Terracina, thence to the sea; "warping" the Pontine Marshes *en route;* but by this line the course of the river would have been doubled, the declivity so slight that the bed of the river would have been "filled up" before the marshes were reached.

In 27 B.C., Augustus Cæsar consulted 700 engineers, but the idea was rejected as impossible.

In the time of Tiberius the inundations were attributed to the tributaries, and the Emperor proposed their diversion; but such was the popular reverence for the waters, or probably so keen was the sense of their importance for the purpose of defence and navigation, that the Senate rejected the proposition.

In 41 A.D., Claudius, seeing that the port of Ostia was becoming unserviceable, "silted up" as it was by the sands of the sea and by the deposits of the Tiber itself, whose crooked course of 8 kilometers was even then scarcely navigable, cut a new branch, starting from the spot which is hence called *Capo due Rami*, and constructed a new port to which Trajan added magnificent warehouses. But this port shared the fate of its predecessor, and is now more than 3 kilometers from the sea.

Nero ordered Severatus and Cellino, "great and daring engineers," to construct a canal from Avernus to Ostia, seeing that the floods ruined edifices, undermined "bridges deemed sacred" (alluding probably to the Sublicius, which had been rebuilt in stone and yet destroyed); did not spare citizens, having sacrificed 700 who dwelt in places believed safe. But Nero had consumed, for his follies and vices, the funds of the veterans, and the people murmured, and the project was abandoned. Aurelian built walls along the Tiber. The Pontiffs Nicholas III., Martin V., Sixtus IV., Alexander VI., Leo X., Clement VII., Paul IV., Pius V., Sixtus V., Alexander VIII., Clement VIII., and Innocent X., all made strenuous efforts to diminish the inundations. Some proposed to deviate the Arno and bring it down by Marino, Tivoli, and Velletri to the sea; others to make a grand reservoir on the left bank of the Velino; others to send the Velino to the sea; others again to turn the Tiber into the valley to the Arno, lead it down by the Marienella back into its bed below the city, and to embank its shores. And the embankment constructed across the portion of the Val di Chiana lying within the Roman territory so promoted the deposit of sediment and the elevation of the bed of the valley, that the effect of this measure and of the continued spontaneous action of the torrents was, that the northern slope, which, in 1551, had commenced at the distance of 10 miles from the Arno, was found, in 1605, to begin nearly 30 miles south of that river, and, in 1645, it had been removed six miles further in the same direction.* The Tuscan and Roman governments fought fiercely for the safety of their respective rivers, and the conflicting interests prevented the general drainage of the Val di Chiana until the latter half of the eighteenth century.

In 1678 a very quaint and talented Dutch Engineer Cornelius Meyer, having been ordered by Clement X. to make a report on the Tiber throughout its length and breadth, went to Perugia and came down to Rome by water, "noting on paper all that seemed worthy of record," and because, as he puts it, "other people should not, as too often happens, steal his ideas and inventions and discoveries," he thought it well to print everything in a book, and a very wonderful book is this, on *L' Arte di restituire a Roma la tralasciata nauigatione del suo Teuere.* It is divided into three parts—1. On the impediments to navigation which exist in the bed of the Tiber between Perugia and Rome. 2. On the impediments to navigation between Rome and the sea. 3. Why Rome was built and maintained on the banks of the Tiber, and other propositions useful to the Ecclesiastical State. The folio volume, with maps and diagrams, is dedicated *Alla Santita di nostro Signore Papa Innocentio XI.*

In those days, before the invention of railroads, the Tiber as a navigable river was of paramount importance to Rome, and Cornelius Meyer maintained that the water traffic with Perugia might be restored easily, so that by the shortest and safest way all the products of Perugia, Umbria and the countries on their borders might be brought down for the abundant maintenance of the inhabitants. Thus we should no longer be dependent on the good-will or convenience of *foreigners* for oil from the Riviera of Genoa, wines from Sicily and Corsica and other parts, whose cargoes are often seized by pirates, or lost in tempests, and the price of merchandise thus raised. The money of Rome would remain in the provinces, and increase the wealth of the Ecclesiastical States.

In the chapter "Why Rome was built on the Tiber," the author launches out against those presumptuous engineers who propose to deviate the river from the city, treats Roman engineers with scant respect, and gives descriptions and diagrams of hydraulic works, and of machines used in Holland, of which he says they are totally ignorant. "Unfortunately," he observes, "the finances of Rome are not in a flourishing condition," and hence, in his propositions for preventing inundations, he is compelled to keep this fact constantly in view. So he merely proposes the removal of all obstructions in the river's bed, has no scruples in suggesting the destruction of the old bridges, insists that the river must run level and the banks be of equal width from Ponte Molle downwards.

Intent on restoring to Rome her lost navigation, Meyer goes deeply into the question of keeping the river clear, giving it sufficient depth and width between Rome and the sea; shows by what constant efforts the Pisares have succeeded in maintaining the water traffic of the Arno clear to the sea; shows how the Port of Ancona had become useless, and how all sea-ports can be defended from noxious winds and kept dredged by the currents of the rivers. He attributes the inundations in great part to the insufficient scouring force of the lower branches of the river, and warns the Government that Fiumicino, "where even now in summer ships cannot enter, and are often driven on the bar and wrecked, will soon be altogether unserviceable as a seaport." To avert this danger he considers it indispensable to rectify the curves of the river below the Basilica of St. Paul's, as the bends and meandering courses of rivers, beneficial in their upper reaches, are detrimental near their mouths because they diminish the rapidity of the current, consequently its scouring force, which between Rome and the sea is already too insufficient, owing to the slight declivity of the bed and the division of the river into two branches at CAPO DUE RAMI. The river straightened between Rome and the sea should, he thinks, be led down to a new mouth, after (by

---

* G. P. Marsh.

colmare) leaving its deposits in the Maccarese swamps. He thus indicates the warping system so successfully adopted to fill up the Lincolnshire fens.

Reading this important work during the Tiber fever of 1875, we could but smile at the quarrels of the engineers gathered in Rome, each eagerly vindicating for himself the paternity of this and that project, whereas not a single proposition was made that had not been brought forward and discussed centuries ago.

In 1744, three-quarters of a century after Cornelius Meyer consigned his projects to the press, we find two celebrated engineers, Chiesa and Gamberini, engaged on researches as to the causes of, and the possible remedies for, the inundations of the Tiber. They reject, both of them, the idea of bank walls, as dangerous owing to the extreme height to which they must be raised in order to contain the waters during a flood. Neither do they believe that main drains either side the city could be efficaciously brought back into the river at a few miles below the walls, yet both these works form part of the plan accepted by the present Government.

At the commencement of the present century, during the French domination, a regular organisation of the urban Tiber was proposed and even set in operation under the direction of the celebrated Navier. It consisted in shore-walls on either side the river to serve as promenade and for building purposes, but no provision was made for the main drains or the exclusion of the sewerage from the river, or for embankments on the north of the city. During the present century there have been three great floods—that of 1805, when the waters rose 16·42 at the Hydrometer at Ripetta; that of 1846, but 23 centimetres lower; and that of 1870, when they rose to 17·25, on the 28th December, just three months and a week after the Italians had taken possession of Rome.

In the following January the ministry named a commission of hydraulic engineers to survey the Tiber and its principal affluents, to study the temporary and permanent causes of its inundations, and to propose the remedies against such catastrophes in the future. Projects poured in on all sides: for mountain dykes, for the deviation of the Tiber, the deviation of the Arno and its tributaries, for main drains round the city, for urban and suburban rectifications, for excavation of the bed and removal of obstructions, for shore-walls, and for embankments to the north of the city.

At the end of the year the commissioners excluded, by eight noes against two ayes, all suburban projects, limiting their propositions to the removal of all obstructions from the river, to securing a sufficient and equal width of water-way by the destruction of bridges and ruins now impeding its course, and to embankments and shore-walls where the banks are low or weak.

These propositions were consigned to the municipality, and between the transfer of the capital and the expenses thereby entailed, political occupations, and the comforting chance that one heavy flood is rarely followed by a second for ten and even twenty years, the projects were allowed to slumber until Garibaldi, in 1875, came from Caprera to Rome and woke up the slumberers, giving the Government and municipality no peace until they carried a law through parliament for the immediate commencement of works on the Tiber.

The law passed on the 6th of July, 1875, merely provided that the sum of money to be expended on the Tiber should not exceed sixty million lire; half of this to be paid by the State when a special fund could be appropriated; of the remaining half the Commune was to pay three-fourths, the province of Rome the other fourth; the Government to decide on the nature of the works, guided by the Superior Council of Public Works.

Here, as of old, the difficulties commenced; "projectors" flocked to Rome and inundated the Government with conflicting proposals. Garibaldi, supported by a fair array of engineers, drew up a plan of his own, concise and comprehensive, which he embodied in a letter to his chief ally, the erratic Filopanti, held in great repute for his hydraulic science and for his hydraulic skill in stemming the inundations of the Po. "I consider it necessary," runs the letter, "to deviate the Tiber above its chief tributary, the Arno, to bring it down through the valley of this river as far as Monte Sacro, leaving this hill on the left to follow the plain of the Marranella, and after cutting through the hills below Porta Turba, to descend by the valley of the Almone and restore the Tiber to its old bed below St. Paul's. In Rome there must be a canal with 100 metres of water-way between the banks, with flood-gates through which a given quantity of water can be brought in from the suburban Tiber. This canal, after receiving all the drains of the city, to issue thence by Porta Portere, and, instead of uniting with the Tiber, to run down parallel to the sea, leaving its deposits in the immense Maccarese swamps which it would *colmare* (warp) and fertilise.

"I approve the project for the port, submitted by Wilkinson, to be constructed at Fiumicino, and the railroad from Rome to Fiumicino, projected by Semenya. Meanwhile the plans for redeeming the Agro Romano must be matured.

"The urban canal would not occupy entirely the old bed of the Tiber, but the curves of the river would be rectified and its banks transformed into a public promenade. In my opinion, and that of my technical friends, the deviation of the Tiber, the urban canal and the port would not cost more than eighty million lire."

In these few lines the old General had summed up all the various and colossal plans of the Cæsars and the Popes with the same precision and simplicity as is his wont when penning his battle-orders for the morrow.

The opposition raised against this *multum in parvo* project was intense. Romans, gentle and simple, consider with Cornelius Meyer that the idea of expelling the Father Tiber from the Eternal City is presumptuous and preposterous. The fact that all nations have striven to erect their great cities on the banks of great rivers, Thebes and Memphis on the Nile, Babylon on the Euphrates, Nineveh on the Tigris, Paris on the Seine, London on the Thames, Petersburg on the Neva, Vienna on the Danube; and in Italy, Florence on the Arno, Verona on the Adige, Turin and countless other northern cities on the Po, justifies their feeling. And Filopanti, aware of this popular prejudice, took care in his public lectures to replace the ignominous word "canal" by the nobler denomination of urban and suburban Tiber. Other opponents proclaimed the scheme impracticable;

affirmed that in times of flood no flood-gates would suffice to prevent the mass of waters from re-occupying their old bed, while in times of drought one of the two streams would fail, and fever and every form of disease result. Then came the paramount question of expense. Not only Roman and Italian, but foreign engineers of vast repute scoffed at the sixty million lire, averring that they would not suffice for the simple excavation of the new bed; that until borings had been made and the quality of the soil, especially of the hills below Porta Furba, ascertained, no estimates were possible; and in this assertion Mr. Fowler, sent by the Duke of Sutherland to assist Garibaldi with his experience and advice, fully concurred.

The Minghetti Government, most anxious to conciliate Garibaldi, and keep him engrossed with the Tiber instead of politics, while consulting, as in duty bound, the Superior Council of Public Works, strove to keep the final decision in their own hands; but the members of the Council, after listening attentively to all that the Minister of the Interior could urge on political grounds, and after coming to a clear understanding with the Minister of Finance, politely suggested that the rest was a technical question and must be left with themselves exclusively, and named a fresh commission to examine and report on nineteen different projects. The members of the commission resolved the projects into four distinct systems, and, rejecting three, among which figured Garibaldi's, decided that all the works necessary within the city for systematising the Tiber should be executed, and that this "first series of works" completed, a fresh survey should be made if they proved insufficient, and fresh projects studied and reported on.

The considerations which precede the exposition of the project adopted, and give the reasons for the rejection of the others, appeal strongly to common sense, even though competent authorities contest their value.

The engineer Canevari, who has been mainly responsible for the decision, affirms that the causes of the inundations of the Tiber are yet to be discovered; that the meteorological observations made previously to 1870 were all insufficient; that it can only be affirmed with certainty that a given quantity of rain must fall for four or five days in the watershed of the Tiber and its tributaries before the river overflow its banks, but that how much of this is absorbed by the soil, how much evaporated, and how much flows into the Tiber, is not yet ascertained. For a long series of years it was deemed necessary for a certain quantity of rain to fall in the valley of the nearer tributaries in order to produce a flood, and especially in that of the Arno; but in 1870, between the 23rd and 27th December, the Arno flowed in neither higher nor lower than usual, and the flood of the 28th was attributed to the quantity of rain that fell in Perugia, to the mass of water that flowed into the upper reaches of the Tiber and to the various drains of the valley of Umbria. The numerous meteorological stations now opened along the Tiber will materially assist future researches as to the causes of floods. Again, little or nothing is known of the intricate net of drains which, constructed at different periods, permeate the subsoil of the Tiber's basin. Certain it is that when the waters in the river do not rise higher than 14 metres at the Hydrometer of Ripetta (the level of the bed here in ordinary mean water being 5·20 above the sea-level), the first sign of flood is given by the waters gurgling back through the sewers and emptying themselves by the mouths of these into the squares and streets; and moreover the flood is limited to the lower portions of the city, so divided from one another by higher ground that the waters do not find a common level, but stand for instance far higher in Via Ripetta than in the Pantheon Square, where they arrive by the great drain which empties itself into the river near the Island of the Tiber, while the waters in the Ghetto are yet lower. These "floods of expansion," as Signor Canevari calls them, frequently occur, and do not inspire such terror among the inhabitants of Rome as does the first cry of "the Po rises" among the riverside populations of the north. It is only when the hydrometer indicates a rise above 15 metres that the river really becomes dangerous, and invading the surrounding country transforms its valley into its proper bed. In 1870 the waters pouring down from the upper reaches above the mouth of the Arno found serious resistance from the Monti Parioli, and the immense mass of water, again dammed back by Ponte Milvio, crossed Via Flaminia, destroying the walls in parts, in others using them as a canal whereby to enter the city at Porta del Popolo. This current entered the urban bed of the city near the Hospital of St. Spirito, destroying the parapets of the fosse of the Castle St. Angelo and of the Piazza Pia. For some time the waters kept their various levels as in the "floods of expansion;" but once risen to the top of the intervening heights the inundation became general, the waters within the city corresponding to those above, exceeding by several metres those below the city. It is on the data gathered of the various levels of the bed of the river during this flood that the members of the Superior Council of Public Works formed their propositions for future defence. These levels vary from 1 to 4 metres, in proportion to the different widths of water-way, and to the obstacles offered by bridges and protruding edifices along the banks. In ordinary mean water the width of the river from bank to bank above and below the city varies from 90 to 100 metres, but at the edifice *dei Lotti* this width is reduced to 55 metres, and the banks are almost vertical. The 64 metres at Porta di Ripetta are enlarged to 90 metres between the ruins of Ponte Trionfale and the commencement of the Gardens of the Farnesina, and again restricted to 58 metres between the lower portion of these gardens and the vertical walls of the Falconieri Palace; again the river enlarges gradually to 90 and 100 metres at the "Marmorata" and again is narrowed to 80 at the quays of Ripa Grande. The mean discharge of the Tiber at its entrance to the city is put at 280 cubic metres a second; in ordinary floods when the hydrometer indicates the surface of the water at 13·75 metres, it is 1300 metres per second. In the flood of 1870, when the hydrometer indicated the height of the water at 17·22 metres at Ripetta, and higher up at Porta del Popolo at 17·42 metres, Professor Possenti, the president of the commission nominated in 1871, gave the volume of water passing down the Tiber at 2800 metres a second. Filopanti estimates it not less than 4000 cubic metres, observing that those who make the lower estimate do not take into account the temporary excavation of its bed, as the traces are lost by the deposits dropped during the subsiding of the waters, nor the enormous quantities that overflow into the adjacent country. Be that as it may, the width of water-way was insufficient on the one hand, while the discharge was prevented by obstruction at the various bridges at the Farnesina Palace, and especially by the Bridge of St. Angelo, which acted as a dam, the water standing above the soffits of the arches 1·5 metre. Ponte Sisto, where the waters rose above the soffits of the lower arches, and attained the keystone of the higher ones, also helped to dam back the waters; hence the flood.

Ergo, say the commissioners, it is clear that the first steps to be taken are those that may insure a sufficient width of water-way between the *Mattonaja* on the north, to the Marmorata at the south of the city. And in order to effect this, there must be no obstacle above a straight line drawn from the bed of the river; all obstructions must be removed from its bed; the bridges that serve as dams removed or altered, and a uniform breadth of 100 metres between the banks obtained.

And in the "first series of works proposed," the commissioners confine themselves strictly to the means for promoting this immediate end. The bed of the Tiber is to be widened at the Farnesina, with river-walls 1700 metres in height above the zero of the hydrometer and 1·20 metre of parapet; the width of the river between the inner shores of the walls uniformly 100 metres, the same width and height of walls to be given at the Rigola. Instead of closing one of the branches of the river that runs either side the Island of the Tiber, as was first proposed, and widening the other to 100 metres, both are to be retained; the left branch to be 70 metres, the right 60 metres wide, with shore-walls and iron suspension bridge in the place of the old Pons Cestius which now connects the island with the Trastevere. The right shores above Ponte Elio and the bastion of St. Angelo to be cut away till the uniform width is obtained; so with the shore on the right in front of Ripetta. The remains of the old Ponte Rotto, whose two arches on the left of the river were carried away by the flood of 1598, and whose remains, consisting of three arches with two smaller ones, through which the water only runs in time of flood, and now serve as the west pier of the suspension bridge, to be entirely destroyed to its foundations, and an iron suspension bridge thrown right across the river. The remains of the Pons Sublicius, the oldest and most revered of Roman bridges, of which the only traces are its foundations, seen only at low water, are to be excavated, and all the ruins, piles, and incumbrances cleared out between Ponte Sisto and Porta Portere. The bed of the urban Tiber is to be thoroughly ploughed and purged of the extraneous matter there accumulated, especially under the arches of Ponte Sisto, where they form a regular pavement or plateau. The remains of the piles of Pons Triumphalis, that longest of bridges, built by Nero, leading from Campus Martius to the Via Triumphalis over Monte Mario—of whose piers some portions are visible at low water between Ponte St. Angelo and the suspension bridge near San Giovanni dei Fiorentini—are to be removed. It is estimated that this first series of works will cost ten millions, and occupy three years. Should a surplus remain, it is to be devoted to the construction of a main drain on the left of the Tiber to collect the city sewerage, and carry it down into the river below St. Paul's. When these humble efforts have been made, say the commissioners, and we see what discharge can be thus attained, we shall be able to judge better of the future necessities. It will be seen whether it be necessary to throw up strong embankments on either side above the city, to level its bed above and about Ponte Molle; whether the river walls are advisable the entire length of the Tiber's urban course; whether it be necessary to amplify the Bridge of St. Angelo, to build embankments below the city to protect the Basilica of St. Paul's, and then may be solved the much-vexed question of the rectification of the bends to the south of the city, while the new hydrometers to be opened at the Milvian Bridge, St. Angelo, San Giovanni dei Fiorentini, Sisto, Quattro Capi, and Rotto, at the Civita Vecchia Railway Bridge, above and below the mouth of the Arno, will enlighten us as to the declivity of the river in the various stages of its course at present, and serve to compare it with the declivity obtained after the proposed systematization.

When we confront these modest proposals with the gigantic schemes of the Cæsars and of Garibaldi, we cannot help exclaiming,

> "Oh, what a fall is here!"

hoping that the commissioners may obtain a relative fall in the waters during flood-time. A strong argument in their favour is the fact that their staunchest opponents admit that this series of works is at any rate indispensable, even were the suburban and urban channels decided on; that the waters having to struggle with fewer impediments will flow with greater rapidity, and that the level of the surface in ordinary mean water, as in flood, will be lowered, though not to the extent imagined by the sanguine projectors. Hence, as the lesser does not exclude the greater, nor a part the whole, the champions of the deviation scheme, believing that its realisation can alone guarantee Rome against the perils of inundation, smile complacently at these small beginnings, and repeat

QUOD DIFFERTUR NON AUFERTUR.

TOPOGRAPHICAL SURVEYS IN ASIATIC RUSSIA DURING 1875.

By M. Venyukof.*

It has been customary for many years to exhibit to the Emperor the results of the Topographical Surveys made throughout the Russian Empire in the course of the past year. This exhibition possesses great interest, for it shows at a glance what progress has been made in the different portions of the Empire. This year's exhibition was particularly interesting, more especially on account of the many new maps referring to Asia. There were no less than 104 separate works on Asia in the catalogue, several of them consisting of numerous sheets, and they occupied a considerable space in the Winter Palace. There were printed maps, manuscript surveys, sketches made in the field, photographic copies of plans, memoirs to accompany them, and a few books, partly still in manuscript.

---

* *Isv. Russian Geographical Society*, 1876. Part 2.

1. A Topographical Survey of the Gulf of Tartary and the Japan Sea, from Castries to Plastun Bay, executed in 1874, by a Topographical Detachment under the superintendence of M. Bolshof, attracted general attention. The survey was made on a scale of 1 verst to the inch, and is laid down upon 47 sheets, the contents of each being shown on an index map. This work fills up a large gap in the geography of the Maritime District of Eastern Siberia. It is more especially interesting, as we learn from it that there exist in the small valleys debouching upon the Japan Sea numerous settlements of Chinese and Orochi, who fish not only, but also carry on agriculture on an extensive scale. We learn from this map that the summits of the Sikhota Alin attain a height of 5000 feet. These mountains are covered with woods, consisting of conifers in the north and of foliferous trees to the south of lat. 47° N. Our surveyors failed to identify the Suffren Bay mentioned by La Pérouse, but they identified Ternei Bay. Careful astronomical observations enable us to place this survey accurately upon our maps.

2. A map of the route along the Rivers Shilka, Amur, Usuri and Sungari, and thence to Vladivostok, constitutes an important addition to our knowledge of Siberia. It is drawn on a scale of 5 versts to the inch, and shows the position of all the Russian villages along the Amur, many of which have been removed further inland, on account of the periodical inundations of the river. It shows, for the first time, the position of Blagovesenye, a Korean village below the Khingan mountains, which is the most flourishing agricultural settlement on the Amur, and boasts of 120 homesteads, a temple, a school, &c. Detailed plans of the principal towns, such as Blagoveshchensk, Khabarovka, Vladivostok, Nikolayevsk, &c., are furnished. Vladivostok, as originally projected, extends for several versts along the bay known as the Golden Horn. This extent, however, is partly accounted for by a range of cliffs, upon which buildings have been erected. A dry dock is being constructed at Vladivostok; but the road into the interior, along the Seifun, is practicable only for led horses, although the town is at present the capital of the Maritime District. The non-existence of a carriage-road is accounted for by the mountainous and swampy nature of the country, but this circumstance only proves to us that Vladivostok is not a suitable capital for the two districts of Amur and Usuri. Khabarovka occupies a far more central position, and there can hardly be a doubt that it will become the capital at no distant period.

3. Amongst the labours of the Topographical Section of Eastern Siberia there is a triangulation of the district of Nerchinsk, which is to be extended. Our maps of Eastern Siberia have been compiled hitherto from mere route surveys and topographical sketches based upon a few points determined astronomically. Most of them are full of gross errors. On Budogorski's map of the Amur, for instance, Ust Strelka is half a degree too far to the south, and the course of the Chikoi is quite distorted. These triangulations will enable us to rectify our maps.

4. We possess a general map of Western Siberia on a scale of 10 versts to the mile, but it is based upon very inadequate materials. Miroshnichenko continues his astronomical observations, whilst the surveyors have completed a 2-verst map of that portion of the district of Semipalatinsk which lies beyond the Irtysh.

5. Orenburg supplies a few objects of great interest. The route map connecting Lake Sam with the salt swamp Barsa-Kilmes, to the west of Aibugir, is particularly interesting. It is combined with a line of levels which joins the Aralo-Caspian line of 1874. Two fine maps of the country of the Orenburg Cossacks (scale 5 versts to the inch), and of the Bukeyef Horde (10 versts to the inch), likewise deserve to be mentioned, for they considerably enlarge our knowledge of these districts. There are likewise a survey of the district of Nikolayef in the province Turgai (1 verst to the inch), and plans of the salt-works in Iletzk and of the coal mines near the Rivers Ut and Suryanyam.

6. The Topographical Section of the Caucasus, under the direction of Colonel Stebnitzki, has exhibited a series of important works on Asia. We are furnished with a map of the Trans-Caspian territory, on a scale of 20 versts to the inch, based upon astronomical and topographical survey. There is likewise a map of that portion of the Usboi which lies between the River Balaishen and Sary Kamysh, from a survey made in 1875. The map of Trans-Baikal shows that much remains to be done before our knowledge of these countries can be called complete. It is joined on the south by a map of Persia, drawn on the same scale (20 versts to the inch), and consisting of 12 sheets. This map is accompanied by a learned memoir by Stebnitzki, filling a stout volume. A map of a broad belt of country, and extending from the Bay of Enzeli to Teheran (2 versts to a mile), is likewise an important addition to our knowledge of Persia. The 12-sheet map is at present being engraved, and was represented at St. Petersburg in photographed copies merely.

A small hypsometrical map of the Caucasus (40 versts to the inch) attracted much notice. It is to be consulted when shading the hills on larger maps. The necessity of such a standard of comparison is demonstrated by Colonel Artamonof's map of Turkey in Europe, upon which the Carpathians are tinted far too lightly in comparison with the Balkans, and to a certain extent the same remark applies to Stebnitzki's large map of Asia Minor. Amongst other maps of this section we mention that of Ajaria and a portion of the vilayet of Trebizond (5 versts to the inch).

7. The work of the Turkistan Topographical Section joins that of Orenburg in the south. Ferghâna, the theatre of so many warlike events during 1875, engaged the principal share of its attention. Ten routes surveyed and combined into a map of the district of Namangan, or rather of the valley of Ferghâna, for it extends to the foot of the southern hills.

A survey of the desert Moyun-Kum, to the south of the Chu, has been completed, and much additional information will be found on the maps of the environs of Samarkand, Jizak, Khojent and other places. Samarkand and Katty-Kurgan have been connected by a triangulation, which affords a trustworthy base for detail surveys. The sketch of the Hissar Expedition has already been published.

A photographic copy of the map of Asiatic Russia, which attracted so much attention during the Geographical Congress at Paris, has been prepared by the Topographical Department of the General Staff. The publication of this map will no doubt prove as successful as did that of the 4-sheet map of Central

Asia, which is drawn on the same scale, and is being kept up to date. Revised copies of the maps of Orenburg and Western Siberia have been printed, and four sheets of the map of Turkey in Asia have been engraved at St. Petersburg. The map of Khiva and of the Lower Oxus has been produced by *heliogravure*, and a copy of it, by Major Wood, has been published in the *Journal of the Royal Geographical Society*.

The large room in which these maps were exhibited likewise contained a few works on the military statistics of Central Asia. Many of these are by the author of this paper, such as the second part of a "Military Description of the Russian Frontiers in Asia," a "Sketch of India," papers on the Kurds and the military forces of Japan and China, with a map showing their distribution, a "Report on the Armies of Russia in Asia, China, Japan, India, Eastern Turkistan, and Turkey in Asia." There was likewise a memoir on the military forces of the Ottoman Empire, prepared by the Oriental Scientific Committee, and accompanied by a map showing their distribution in the beginning of 1876. We learn from this publication that the military forces of Asia, exclusive of Burmah, Annam, Afghanistan, Beluchistan, and the Dutch, French and Spanish Colonies, consist of 1,384,000 men.

There was also exhibited the Chinese collection made by Sosnovski and Pyasezki, consisting of products of Chinese industry, photographs, sketches, &c. It included a map of Matusovski's route from Hankau to the Zaisan post.

CHAMPA.

[The following article on Champa was written for the *Encyclopædia Britannica*, 9th edition, the subject being one of those which the writer had some years since agreed with the original editor, Professor Baynes, to prepare. The article has been omitted from the *Encyclopædia* for reasons which the writer does not clearly understand, but as it seems to himself worth printing, and as he knows it to contain matter which it took some time and trouble to collect, he has forwarded it to the editor of the *Geographical Magazine* for disposal. H. Y.]

CHAMPA is a name which has been for a very long time applied to a portion of that region to which we give the name of Cochin-China, though the extent covered by the name has varied. It is from the Malays that western navigators adapted most of the geographical nomenclature of the Eastern Seas. And Crawfurd implies that the Malays gave the name of Champa to the whole of the most salient part of the Cambojan Peninsula, including a part of the coast of the Gulf of Siam, as well as part of the China Sea.* It is possible that this usually accurate writer has here made a slip. But in any case the most ancient use of the name would seem to extend it to the Gulf of Siam. For there is strong reason to believe that both the Zaba of Ptolemy, and the Çanf or Tsanf of the early Arab mariners, both of which are demonstrably to be placed westward of Cape Camboja, are only representative of the same name, Champa. It is a persistent tradition in modern Camboja that the Cham or Tsiam race, the proper people of Champa, did occupy the Cambojan soil before the arrival of the Khmers, who have held it, probably, at least since the fourth or fifth century of the Christian era; and M. Garnier, who gave great attention to these questions, has deduced from such data as exist, in the Chinese annals and elsewhere, that the ancient kingdom which the Chinese describe, under the name of Funan, as extending over all the peninsula east of the Gulf of Siam, was a kingdom of the Cham race.

But in the medieval narratives of western authors (*e.g.*, Marco Polo, Friar Odoric, John Marignolli, Rashiduddin) the name Champa applies to that region which is now sometimes called Cochin-China Proper, as distinguished from Tongking, viz., the protuberant S.E. coast of the peninsula in question, extending northward to 16° or 17° of latitude, the position of which on the route to China caused its shores to be well-known to those voyaging to that country. This, or nearly this, was the kingdom called in the oldest Chinese annals Lin-i, and afterwards, till its extinction, Chenching. We hear of Chenching or Champa as being often at war with its neighbours, Tongking on the one side, and Chinla or Camboja on the other, and as for a time, at the end of the twelfth century, completely conquered by the latter. But it had recovered independence a century later, for Kublai Khan (1280-1290) had dealings in war and diplomacy with its king. According to Javanese annals, about the middle of the fifteenth century the queen of the principal sovereign of Java was a princess of Champa.

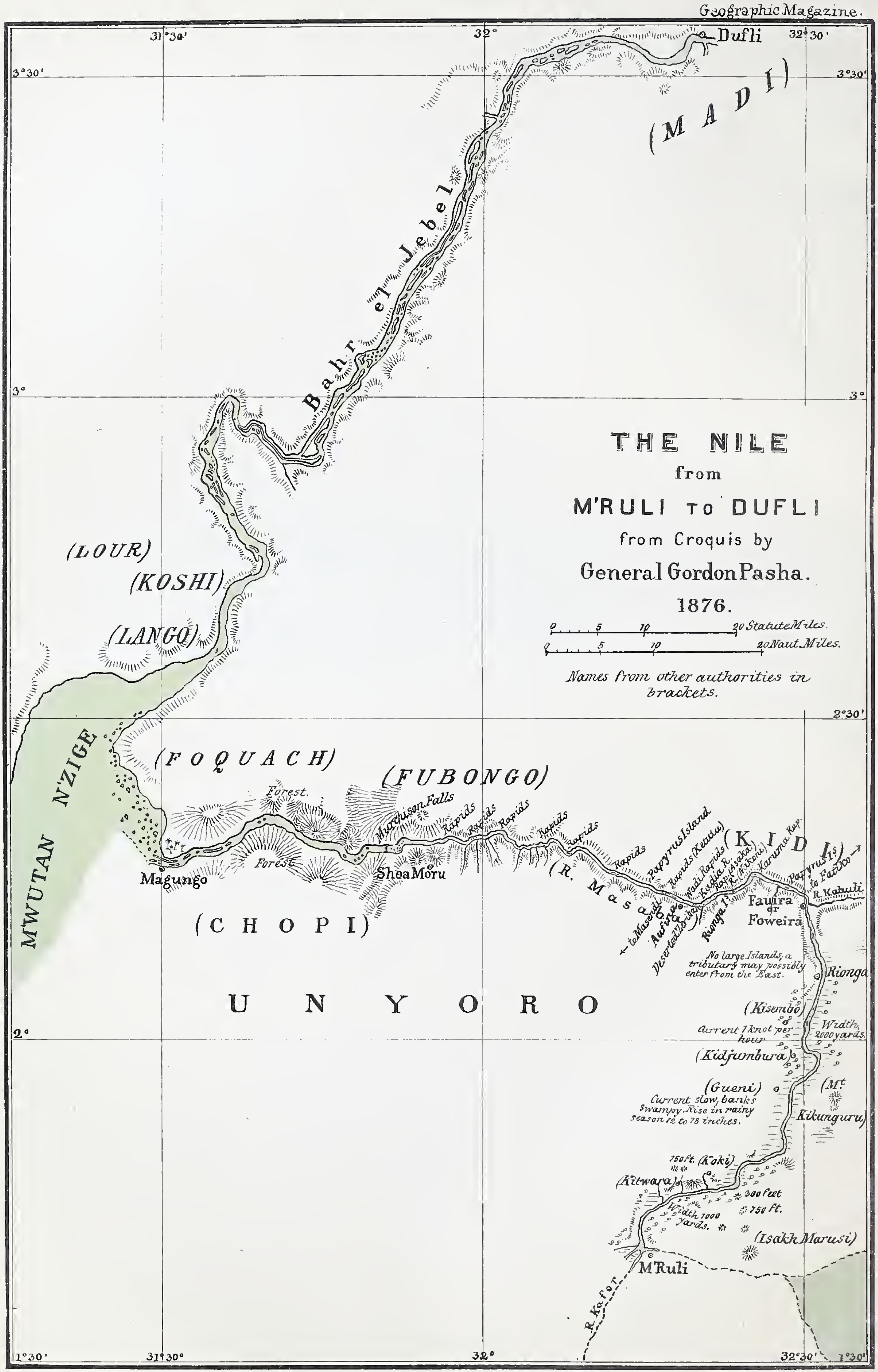
The precise historical relation of this ancient kingdom to the modern kingdom, which we call Cochin-China, is a little difficult to disentangle. But this southern kingdom of Chenching or Champa was conquered in 1471 by the King of Tongking or Anam, and has never since revived. For though there was for a long time, subsequent to the date named, and down to 1802, a separation of Tongking and Southern Cochin-China into two distinct kingdoms, the latter was not a revival of Champa, both being ruled by dynasties of Anamite origin. And after the conquest the name of Champa seems to have become restricted to the districts adjoining the south-eastern curve of the coast, and eventually to that district immediately eastward of the Cambojan delta, a somewhat barren tract with fine natural harbours, now called by the Cochin-Chinese *Binh-Thuân*.

This continued to be occupied by the people called Chams or Tsiams, whose dominion we thus presume (as far as we can see light in these obscure histories) to have first extended over the whole peninsula (as *Funan*); then to have been limited to its eastern and south-eastern shores (*Chenching*); and lastly to have been restricted to a small tract of those shores (modern *Champa* or *Binh-Thuân*).

Here a principality of Champa long continued to subsist, the residence of the prince being at a place called Phanri, about 10 miles from the sea, and apparently near, if not identical with, the present Binh-Thuân. The Champas, his subjects, were, in the sixteenth and seventeenth centuries, well known over the Archipelago as rovers and sea-faring people. This principality was often overrun by the Cochin-

---

* *Descriptive Dictionary*, "Indian Archipelago," *sub voce* Champa.



THE NILE
from
M'RULI TO DUFLI
from Croquis by
General Gordon Pasha.
1876.

Names from other authorities in brackets.

E. G. Ravenstein.

Chinese, but maintained itself in some shape of recalcitrant subjection to the latter till about 1820, when the Anamite King conquered it effectually, expelling the Champa prince and most of the people of the same race.

Name.—The name Champa is Indian, like the adjoining Camboja (q. v.) and countless other names in Indo-China; and was probably borrowed from that of an ancient Hindu state and city which stood upon the Ganges, near modern Bhâgalpûr. Hwen-Thsang, the famous Chinese ecclesiastical traveller of the seventh century, makes mention both of the original Gangetic State (which he visited), and of the Indo-Chinese kingdom (which he knew only by hearsay), calling the latter *Mahâ-* (or "Great") Champa;* an indication, perhaps, of its ample dominion, either then subsisting or traditional, an amplitude of dominion which nearly all states of Indo-China have enjoyed in turn. Hindu titles are also distinctly traceable in the corruptions of the old Chinese notices of the names of kings, and even in one mentioned by Marco Polo.

Ethnology and Religion.—The people are known in Camboja as *Tsiams*, to the Anamites as *Loï*, *Thuân*, and *Thieng*. We do not know whether the former name has been taken from Champa, or the adoption of the Indian name Champa been suggested by the name of the people. They have been in great part driven into the mountains, or into the Cambojan and Siamese territory, where a number of them are settled near the Great Lake. There were also old settlements of them on the Cambojan coast, between latitude 11° and 12°. The people are said to exhibit, even in language, strong Malay affinities, and they have long professed Muhammadanism. *The books of their former religion,* they say, *came from Ceylon,* but they were converted to Islam by no less a person than 'Ali himself. The statement in italics is interesting. For the Tongking people received their Buddhism, such as it is, from China; and this tradition marks Champa as the extreme flood-mark of that great tide of Buddhist missions and revival which went forth from Ceylon to the Indo-Chinese regions in an early century of our era, and which is generally connected with the name of Buddaghosha.

Antiquities.—There have been many reports of the existence of monuments of Indian or Buddhist character in the Champa country; and Mr. Crawfurd saw an image of the Hindu god Ganesa, which was brought from that country to Singapore by a M. Diard in 1821. But there is, we believe, nothing yet precisely known as to the monuments, and indeed the late M. Garnier doubted their existence. There are also said to be many Mussulman structures, such as minarets and tombs, with Arabic inscriptions.

The district of Champa or Binh-Thuân, is one of those especially productive of eagle-wood or aloes-wood, and the *Tsanfi*, or aloes-wood of Champa, was one of the kinds in high repute with the old Arabs. The native name is *Kinam*. Ebony is also abundant.

Medieval Notices.—Both these products are mentioned by Marco Polo, who visited Champa as a commissioner from Kublai Khan about 1285. It was also visited forty years later by the Franciscan Odoric of Pordenone. Both travellers notice as prominent facts the immense family of the king, and the great number of domestic elephants that were kept. Both circumstances are still characteristic of most of the Indo-Chinese States. (Garnier, *Voyage d'Exploration;* Crawfurd, *Mission to Siam*, &c., and other works; *Bastian, Reise*, i. and iv.; *Mouhot's Travels; de Mailla, H. Gen. de la Chine*, tom. xii.; *Bishop Louis in J. As. Soc. Bengal*, vol. vii. and viii.; *Tableau de la Cochin-Chine*, &c., &c.)

H. Y.

THE NILE FROM MRULI TO DUFLI.

In the third number of the *Bulletin of the Egyptian Geographical Society* have been published four maps of the Nile from sketch surveys of General Gordon. These we reproduce on a reduced scale and on a single sheet. On the originals Dufli is placed in lat. 3° 34′ N., long. 32° 20′ E.; Magungo in lat. 2° 16′ N., long. 31° 30′ E.; Fauira in lat. 2° 12′ 35″ N., long. 32° 20′ E. There are degree lines on three of the maps, but they are so evidently incorrect that we felt bound to discard them. The fourth sketch, which gives the Nile between Mruli and Fauira is supposed to be drawn on a scale of 1:320,000, and the direct distance between the two places named amounts to no less than 62 geographical miles. We have preferred placing Mruli in the position it occupies on Baker's map, viz., lat. 1° 40′ N., thus reducing this distance to nearly one-half. There are hardly any names upon the maps, and they differ so essentially from preceding maps, that it is by no means an easy matter to place upon them the names of villages and other localities mentioned by preceding travellers. This lack of names is most annoying in the case of the Nile between the Mwutan Nzige and Dufli, the more so as Gessi was one of the exploring party, and might easily have identified the places inserted upon his own map.

Lieut. Chippendall was the first European who crossed the Nile between Dufli and the Mwutan Nzige. On the 3rd March, 1875, he reached that river overland in about 2° 30′ N. lat., where it is 450 yards wide and runs two knots an hour. He crossed over to Fashoda, a village of the Koshi, whose chief was Wadelay.* The river is described as winding about very much and as forming a shallow lake to the south, dry during the greater part when the water is low. The big lake was said to be three days' easy march to the south. Above Fashoda the river was said to split into two branches, one coming from the lake, the other from Magungo. Dongolani soldiers, who had once been on a raid in the country of the Lour, to the west of the Koshi, told Chippendall that they saw these two branches from the hills there. There cannot be the least doubt that the bifurcation referred to is the same as that noticed by Gessi a year afterwards, but whilst the latter says that this branch flows towards the N.N.W., the information collected by Chippendall tends to show that it, too, like the main stream, derives its origin from the lake, and converts the hilly countries of the Koshi and Lour into an island. General Gordon did not notice this branch, but expresses a belief in its existence. Chippendall tells us that the natives of Fashoda were mostly naked, but that a few wore skins of goats round the loins. Nearly all wore a ring through the upper lip.* Gessi ascended the river from Dufli to the lake in March 1876. The ascent occupied ten days, owing to contrary winds, incessant rains, and the current. The distance he estimates at 164 miles, and the river throughout is described by him as being navigable, deep and broad, the width in certain places exceeding 700 yards. The natives he found clothed in skins of antelopes or goats. The country was fertile. The principal products were millet, sesamum, honey, tobacco bananas and beans. Cattle were abundant.

---

* Julien, *Pèlerins Bouddhistes*, iii., 83.

* This chief's name will be found on Gessi's map in *Geographical Magazine* for September 1876.

General Gordon ascended the river in July 1876, in a steamer. Measured on his map the distance from Dufli to the open lake is 110 miles, and thence to Magungo 21 miles more, or a total of 131 miles as compared with the 168 miles of Gessi. About 20 miles below Dufli the river begins to widen, and the current becomes less rapid, amounting to no more than half a knot an hour. There are numerous islands covered with papyrus, which also fringes the banks and renders landing difficult. The country is populous and the natives are well disposed. Fifty miles below Dufli they wear a skin, but lower down they clothe themselves in the bark of a tree. The banana is cultivated between the 40th and 50th mile below Dufli, and again near the lake. The latter is sad and deserted in appearance, and thousands of papyrus islands render it difficult to find the entrance to the Victoria Nile. This river may be navigated to the foot of the Murchison Falls, but from that point to the Karuma Rapids, below Fauira, navigation is rendered impossible by numerous strong rapids.†

THE LATE CAPTAIN J. E. DAVIS, R.N.

By the sudden death of Captain J. E. Davis, a severe loss has been inflicted upon Hydrography. A man of such well-known and long-tried experience can ill be spared at a time when the number of naval officers skilled in nautical surveying can be counted with ease upon the fingers. Captains Davis and Evans (the present hydrographer) were the last of the stock of old Masters R.N. selected by Sir Francis Beaufort and Admiral Washington for scientific duties at Whitehall. Captain Davis has gone. Captain Evans alone remains. For about forty years the former officer had been doing his best to add to the efficiency of the Admiralty charts. In 1835 he was working in H.M.S. 'Beagle,' and received the thanks of Sir Francis Beaufort for his assistance in the "splendid survey" of Captain Robert Fitzroy.

Between 1839 and 1843 he served in the 'Erebus,' Captain Crozier, in the Antarctic Expedition under Sir James Ross, an adventurous voyage, in which many interesting and important additions were made to our scientific and geographical knowledge. On his return to England, Captain Davis, who was an excellent draughtsman as well as a scientific seaman, having executed the charts and drawings of the Expedition, was again thanked by Sir Francis Beaufort and promoted to the rank of Master R.N. From 1844 to 1864 Captain Davis was employed in surveying the west coast of Ireland and south coast of England, with the exception that, in 1860, he was lent by the Admiralty to do duty as Surveying Officer of the yacht 'Fox,' under the command of Captain Allen Young, during her cruise to Greenland.

In 1863 Captain Davis joined the Hydrographical Department of the Admiralty as a Naval Assistant. The important duties he at once undertook may be best described by quoting from Admiral Richards's sketch of the department:

"The Second Naval Assistant performs duties of a miscellaneous but most important character; he acts as the curator of all the original documents in the department, amounting to about fifty thousand; he enters and marks with particulars every original chart or other document that is received, and sees that they are catalogued and placed on their proper shelves. The distribution and recataloguing of the whole of the original documents on an improved system is now being undertaken—a work long required, and involving much care, labour, and time. Under the direction of the Chief Naval Assistant, this officer also prepares for publication all notices of dangers, of new lights, of any changes which require to be known very promptly; these are very numerous, and are termed 'Notices to Mariners.' He has charge of the Admiralty instruments, and keeps an account of their issue to and return from surveying vessels, and consults with the hydrographer as to new purchases and repairs, also of deep-sea sounding gear."

The observations connected with deep-sea soundings all passed through his hands, and he was intrusted with the publication of the results of the deep-sea explorations made in the 'Challenger' by Captain Nares.

The singular ingenuity of Captain Davis was of great service to the country when deep-sea sounding became a prominent part of the duties of a Nautical Surveyor. The various mechanical contrivances for obtaining the depth, the nature of the bottom of the sea, and the temperature at different depths, all passed under his able superintendence. He was to be found at Chatham Dockyard arranging the style and manufacture of the sounding line; at Whitehall receiving and listening to inventors with a kindly patience; or with Mr. Casella, in Holborn, testing the amount of pressure that could be borne by deep-sea thermometers. The 'Challenger' Expedition owed much of its success to the excellent deep-sea thermometers with which it was provided; these were prepared by Mr. Casella, under the supervision of our ingenious Captain. Davis's "accumulator" plays an important part in the outfit of any ship fitted to obtain deep-sea soundings. The common telescope has been improved by a simple invention of the Captain's for opening and shutting the shade that protects the eyepiece; while the sextant has received from his fertile mind a useful addition to the mechanism for reading the arc.

Our industrious sailor had also found time to devote his attention to literature useful to his brethren of the sea and travellers on the land. The *Athenæum*, the *Nautical Magazine*, in common with this journal, will feel with regret the loss of Captain Davis's instructive contributions. In completing the *Azimuth Tables* of his old friend and colleague Captain Burdwood, and with the assistance of his son, Mr. Percy Davis, of the

---

* *Proceedings of the Royal Geographical Society*, vol. xx.

† For Gessi and Gordon's accounts, see *Proceedings of the Royal Geographical Society*, vol. xxi., and *Bulletin of the Egyptian Geographical Society*.

Nautical Almanac Office, carrying on those tables from the parallel of 30° to the Equator, a simple and ready method of determining the deviation of the compass has been placed in the hands of seamen; and as long as iron plays an important part in shipbuilding, so long will the names of Burdwood and Davis be held in grateful remembrance by sailors who take pride in the safe navigation of the vessels intrusted to their charge.

The above list of services form a fair roll, and would entitle Captain Davis to the thanks of a maritime nation; but there was yet another field in which our indefatigable sailor was also eminently successful.

Few who have had the good fortune to hear them will forget his carefully prepared and admirably illustrated Arctic lectures. These interesting discourses were given in many parts of the country; and as he never talked over the heads of his audiences, but confined himself to a simple description of Arctic life, with its many alternations of trial and triumph, of danger and delight, enlivening the same with pithy anecdote and good-natured humour, these lectures became deservedly popular. They encouraged that spirit of maritime enterprise which forms so important an element in the composition of our national character. Englishmen delighted to listen to the stories of their forgotten worthies; and even in this prosaic age, we may compare our absent friend, in these lectures, to some minstrel who—

> "So well
> His legendary song could tell—
> Of ancient deeds, so long forgot:
> Of men whose memory was not."

In the autumn of last year the scientific world heard with some surprise and regret that Captain Davis had retired from the Hydrographic Office. Without entering into details, it may be sufficient to observe that, after circumstances that had occurred, he could not have remained in the office without making a sacrifice that would have been attended with a considerable loss of self-esteem. Captain Davis was one of those men

> "Who dared be poor for a' that."

His admirers consoled themselves with the reflection that, although the Hydrographic Office had suffered a loss, the country at large might have experienced a gain. They felt that, freed from the jealousies and vexatious restraints of his official life, their old friend would *now* be able to continue his instructive writing and speaking with all the vigour and breadth they knew him to possess. He was preparing to prove himself worthy of their good opinions, and many hoped to witness his triumphs in the present year, when a higher power intervened. The great Commander-in-chief had need of him, and very suddenly, on the 30th of January, in the 61st year of his age, Captain Davis departed from us. His remains were interred in the Shooter's Hill Cemetery on the 5th February. A few of his comrades stood beside his grave. Captain F. W. Sidney, late of the Australian Survey, Doctor David Lyall, who was with him in the Antarctic Expedition, Staff-Commander T. A. Hull, the Superintendent of Admiralty Charts, and Staff-Commander D. Pender of the Hydrographic Office.

It has in some quarters become the fashion to suppose, that there is but little cause to regret the loss of an able man from any post in the public service, because, through our large population, there are so many anxious to fill his place. We are inclined to consider such ideas as fallacious, that the finding of good and fit men is not so easy a matter as some of our philosophers would have us to believe. The experiences of the past bear witness against the idea that quality may always be found among quantity. Quantity in Greece, Rome, and Venice did not prevent the fall of those States, when quality failed them. In conclusion, we can only trust that their lordships may be fortunate enough to find among the rising young naval officers of the present day one who may possess not only the zeal and ingenuity, but also the amiability and consideration for others which were the characteristics of John E. Davis.§

Reviews.

—:o:—

ACROSS AFRICA.[*]

The readers of the *Geographical Magazine* are already well acquainted with the history of Cameron's memorable expedition, with the difficulties he had to encounter, and with the gallant way in which he overcame them. The important work containing the narrative of his journey is now before us, and by this time it has been read by thousands of Cameron's countrymen. In it he relates, in full detail, the numerous incidents of his enterprise, and supplies information respecting a vast region previously unknown. It is Cameron's great merit that he has, with unwearied patience and devotion, accumulated so complete a series of observations as to have given us a really accurate delineation of the whole width of tropical Africa, including a section derived from hypsometrical data. With this firmly established basis on which to build his narrative, the value of what he has to tell us is increased a thousand fold. As a scientific observer, he stands first among the foremost explorers of tropical Africa. He has now proved that he is well able to tell the story of his travels, and, in a manly, straightforward style, he narrates the numerous eventful incidents of his long and toilsome journey, and describes the scenery, the physical features, the products, and the inhabitants of the regions through which he passed.

In our number for February 1876 (p. 29), we gave a general account of Cameron's previous labours, and an outline of the results of his march across Africa from the east to the west coast, our article forming, in part, a summary of several previous articles on his expedition. At page 274 of *Ocean Highways* for December 1872, we recorded his former services, and at page 486 (March 1874), we enumerated and described the extraordinary difficulties with which he had to contend, and which he overcame at the outset. The exact nature and full extent of those difficulties are not generally known, and perhaps never will be known. But those which are publicly recorded are sufficiently formidable, and show the indomitable pluck and cool intrepidity of the young sailor. We have so fully described the geographical work that was achieved by Cameron, in former numbers of this Magazine, and its bearing on the general progress of African discovery, that it now only remains for us to give some account of the book, in two volumes, which records the history of a great feat in the annals of exploring enterprise.

---

[*] *Across Africa*, by Verney Lovett Cameron, C.B., D.C.L., Commander Royal Navy, Gold Medallist R.G.S. Two vols., with numerous illustrations. Daldy, Isbister & Co. 1877.

The first volume, divided into nineteen chapters, takes us over the ground from the east coast at Bagamoyo, to Nyangwé on the Lualaba. The narrative of the journey to Unyanyembe is extremely interesting, conveying a vivid idea of the difficulties in the way of progress of the people and the country. Burton's admirable and exhaustive treatise will always stand first as a lucid geographical description of this region, but Cameron's narrative is undoubtedly the best that has been written in a popular style, and will thus supplement the work of his illustrious predecessor. After leaving Unyanyembe, Cameron entered upon an entirely new country; every march he made entailed a discovery, and consequently his narrative increases in interest. On the way to Lake Tanganyika he discovered several of the southern tributaries of the Malagarazi and the region they water. His voyage round the southern half of that lake, including the discovery of the Lukuga outlet, was full of incidents, and the account of it will be read with unflagging interest. Then follows the march across the country of Manyuema to Nyangwé, on the shores of the Lualaba, the furthest point reached by Livingstone. Cameron describes the forest scenery of this part of Africa as very beautiful. His text is plentifully illustrated by woodcuts, including careful drawings of the arms and implements of various kinds, which will be valued by students of ethnology.

Nyangwé, the permanent Arab settlement on the Lualaba, was the point beyond which Livingstone was unable to advance; and here, therefore, the interest of Cameron's famous march culminates. The seventeen chapters of his second volume contain the story of his advance from Livingstone's furthest point, right across Africa to the shores of the Atlantic. In this portion all the ground is new, and a region previously entirely unknown is for the first time brought to our knowledge.

In his final chapters Captain Cameron gives a lucid general description of the physical features of this section of the great continent of Africa, and discusses the important questions relating to commerce and the abolition of the slave trade. This portion of tropical Africa consists of a central plateau, the lowest part of which is the valley of the Congo, separated from low tracts fringing the coasts by chains of mountains. Thus the region consists of three divisions, the low-lying and unhealthy littoral, the mountain ranges, and the central plateau. He describes each of these divisions, and then discusses the questions relating to the tropical lake region; and records his observations and the information he collected respecting the Lualaba and Congo, and their affluents. Cameron's last chapter is devoted to a discussion of the present state of trade and communication in the portion of tropical Africa which he traversed. Besides a small local trade on the east coast in gum-copal and grain, the only articles now exported from either coast are slaves, ivory, beeswax, and india-rubber, and of these slaves and ivory occupy by far the most prominent position. The trade routes are first by land to the east coast ports in the hands of the Sultan of Zanzibar as far as Cape Delgado, and of the Portuguese thence to Delagoa Bay; second, the Nile route; third, the routes to the west coast by Bihé and Kasanji; and fourth, a route southwards, through the Transvaal to Natal. The whole trade is at present dependent on human beings as beasts of burden; valuable labour, which might be profitably employed in agriculture or in collecting wild products, being thus wasted. At page 323 of volume ii., there is a *facsimile* of a curious bill of lading for slaves from Loanda. Here the slaves are invoiced as "*volumes*," that is bales of goods, and opposite to each "*volume*" is noted the marks on the person by which it (he or she) may be known. Cameron believes that ivory will not last long as the main export from Africa, and that the slave-trade is doomed. He, therefore, looks to legitimate commerce as the means of opening up the country, and civilising the people; to the growth of sugar-cane, cotton, coffee, tobacco, oil seeds, pepper, and corn; and to the collection of india-rubber, beeswax, and copal. He also describes the mineral wealth of the country he discovered. He suggests that trading stations should be established on a trunk route across the continent, commencing from both coasts; and he is sanguine that legitimate trade, thus steadily and perseveringly advanced, will check the traffic in human flesh and eventually destroy it. "Let us," he concludes, "work soberly and steadily, never being driven back or disheartened by any apparent failure or rebuff; but should such be met with, search for the remedy, and then press forward all the more eagerly. And so in time, with God's blessing on the work, Africa may be free and happy."

Few men have done more useful work in furtherance of this great object than Verney Lovett Cameron, and the noble profession to which he belongs has just reason to be proud of his memorable achievement—an achievement which was as bravely and gallantly performed, as it is now efficiently and modestly described.

BEYNEN'S EDITION OF THE VOYAGES OF BARENTS

AND THE

VOYAGE OF THE 'GLOW-WORM.'*

The Hakluyt Society having found it necessary to issue a second edition of the three voyages of William Barents to the Arctic regions (1594-96), by Gerrit de Veer, the editorial work was undertaken by Lieutenant Koolemans Beynen, of the Royal Netherlands Navy. This gallant young officer accompanied Captain Allen Young in two voyages up Baffin's Bay on board the 'Pandora,' and thus, in addition to much careful literary research, he brought a practical knowledge of ice navigation to the work of editing the records of the exploits of his countrymen in the Arctic regions.

The first edition was printed in 1853, and edited by Dr. Beke, with a learned introduction which, at the period, was as complete as could be desired. But since 1853 Spitzbergen and Novaya Zemlya have been circumnavigated by the Norwegians; the house in which Barents and his companions wintered has been found, while the researches into the Netherlands archives have thrown much new light on the proceedings of the early Dutch Arctic explorers. For the second edition, therefore, Lieutenant Beynen has written an introduction, in which he gives the results of subsequent researches.

---

* *The Three Voyages of William Barents to the Arctic Regions*, by Gerrit de Veer. First edition, edited by Charles T. Beke, Phil.D. (1853). Second edition, with an introduction, by Lieutenant Koolemans Beynen, Royal Netherlands Navy. (Hakluyt Society, 1876.)

One of the most interesting points on which the later editor dwells is the history of the career of Oliver Brunel, the father of Dutch Arctic discovery, concerning whom a great deal more is now known than when Dr. Beke wrote in 1853, thanks to the industrious and intelligent researches of Mr. S. Muller Fz:—the historian of "De Noordsche Compagnie." Dr. Beke had supposed that Brunel and Alferius, both names which occur in the history of Dutch northern enterprise, were two different people. Mr. Muller has satisfactorily proved that Brunel and Alferius were one and the same man; and Lieutenant Beynen recapitulates his arguments. Brunel was born at Brussels, and, escaping from the tyranny of Alva, he came over to Holland. In 1565 a Dutch ship sailed from Enkhuizen, and formed a settlement at Kola, whence Brunel was sent to Kholmogory, a town near the English factory in the White Sea, to learn the Russian language, and collect all possible information respecting the best manner of establishing commercial relations. Thus he was not only the first Dutch Arctic navigator, but the founder of the White Sea trade with Holland. He was seized by the Russians and kept a prisoner at Jaroslav for several years, until the Czar liberated him, at the intercession of the brothers Anikiew, merchants belonging to the commercial house of the Strogonoffs. Brunel afterwards passed through the territory of the Samoyedes to Siberia, and also made a voyage by sea to the Ob River. On one of these expeditions he discovered the Kostin Shar. Afterwards, as commercial agent of the Anikiews, he opened an annual communication by sea between Kola and Holland. This led to the voyages sent out by Balthazar de Moucheron, and to the establishment of a trading factory, round the site of which rose the city of Nova Kholmogory or Archangel.

In 1581 Brunel arrived in Holland, and proposed to De Moucheron and others the equipment of a vessel with the object of discovering a north-east passage to the Indies. The ship was fitted out at the expense of De Moucheron, and sailed from Enkhuizen in command of Brunel in 1584. But he was most unfortunate, and, after trying in vain to pass through Pett Strait, his vessel was wrecked at the shallow mouth of the Petchora. Feeling that the Dutch at that time were unable to assist him in making a new effort, and not daring to return to the Russians, Brunel then offered his services to the King of Denmark, and made three voyages to Greenland with Knight. There is also reason to think that he was in the English Arctic Expedition with Knight, and that he was the Oliver Browne (Brownel?) who completed the journal after his commander was lost, as related in Purchas, (iii., p. 831). The manuscript of Knight's ill-fated voyage in still preserved in the Geographical Department of the India Office, with the note added by Oliver Brunel, after the disappearance of Captain Knight. The subsequent history of Brunel is lost to us; but we are much indebted to Lieutenant Beynen for having furnished to English readers so full and interesting an account of one of the earliest and most persevering of Dutch Arctic worthies.

The account of Brunel is a fitting prelude to the editor's remarks on the voyages of Barents, some of which are of great importance. For instance, Lieut. Beynen has conclusively proved that Drs. Beke and Petermann were wrong in supposing that, in his third voyage, Barents circumnavigated Spitzbergen, by quoting from an extract taken from a log, probably of Barents himself. The true track of Barents does not go north along the east coast, as Dr. Petermann showed it, but along the west coast. The same view had already been taken by Mr. Asher, in his edition of the voyages of Hudson.

Subsequent research has added nothing to Dr. Beke's introduction, as far as the further voyage of Barents is concerned; but Lieutenant Beynen gives the results of several succeeding Arctic expeditions undertaken by the Dutch, after the return of the survivors of Barents' heroic companions on the 29th of October, 1597. He then proceeds to notice the voyages of Norwegian walrus hunters in more recent times; of Carlsen and Palliser, of Johannesen in 1869, of Torkildsen, Ulve and Mack; and lastly, the voyage of Elling Carlsen in the sloop 'Solid,' who, on September 9th, 1871, discovered the house in which Barents wintered 274 years before. We have already given an account of this discovery and of the relics that were brought home (see *Ocean Highways* for August 1872, p. 157). But Lieutenant Beynen supplies us with a translation of the detailed and most interesting description of these relics by Mr. De Jonge, whose pamphlet on the subject we noticed in a previous number. After the voyage of Carlsen, Captain Gundersen of the schooner 'Regina,' was the first to visit the ice-harbour of Barents on the 17th of August, 1875. In an old chest he found two charts and a manuscript which proved to be a Dutch translation of the narrative of the English expedition of Pett and Jackman in 1580.

In a postscript, Lieutenant Beynen gives an account of the adventurous voyage of Mr. Charles Gardiner, in his yacht the 'Glow-worm,' to the winter-quarters of Barents, during the summer of 1876, a short notice of which was given in our number for December, p. 335. The 'Glow-worm' left Hammerfest on June 23rd, and made her first ice on the 4th of June, about 25 miles to the westward of Goose Land, on the coast of Novaya Zemlya. A continuance of westerly winds had blocked up the west coast with ice, so Mr. Gardiner forced his way into the Matotschkin Shar, and, to his great surprise, found it perfectly clear of ice. On the 25th of July the 'Glow-worm' reached the land-water along the east coast of Novaya Zemlya, and shaped her course across the Kara Sea until she was brought up by a heavy solid pack. Mr. Gardiner then steered north, and entered the ice-haven of Barents on the 29th of July. During the three following days he made a most careful examination of the spot. The ruins of the old house had fallen completely into decay, but, leaving no stone unturned, he made a most interesting collection of more than a hundred different articles. After depositing a record of his visit, Mr. Gardiner left the ice-haven on the

2nd of August, and shaped his course to White Island. But he was always stopped by impenetrable ice about 30 miles from the land, and unable to make any easting, he was forced to turn the 'Glow-worm's' head to the south. After encountering great dangers in the Kara Sea, he passed Pett Strait on the 23rd, and arrived safely at Hammerfest on the 28th of August.

His collection of Barents' relics consisted of carpenter's tools, broken parts of old weapons, a wood stamp, a leaden inkstand, two goose-feather writing pens, a small pair of iron compasses, a harpoon, twenty well-preserved wax candles, three Dutch books, two coins, and the ship's flag, which is the first European colour that ever passed a winter in the Arctic regions. Mr. Gardiner also found, inside a powder-horn, the manuscript record left behind by Barents, which is still legible. It states the principal events of the voyage, and is signed by Heemskerck and Barents. The signature of the latter worthy was, until now, unknown. Mr. Gardiner, knowing that the other relics brought home by Captain Carlsen were deposited in the Museum at the Hague, and aware of the interest they possess for the countrymen of the great explorer, has most generously presented his collection to the Dutch nation, a courteous act, which is appreciated as it deserves by the people of Holland.

The introduction by Dr. Beke and the text of the journal of Gerrit de Veer are reprinted without alteration in the second edition; the value of which is greatly enhanced by the additional information contained in the new introduction by Lieutenant Koolemans Benyen. If the Dutch navy ever joins in the work of polar exploration, there will be found, in the able editor of the voyages of Barents and the companion of Allen Young, a worthy successor to the great Dutch explorers of former days.

RUSSIA.*

In concert with all Russians, who assert that their country suffers very much in consequence of the ignorance which prevails in Europe, and especially in England, in respect to themselves and their own affairs, it is the usual habit of English authors of works on Russia to deplore in their prefaces this great want of enlightenment in their own countrymen. Now it cannot be maintained that, as a reading public, we know little about Russia, for the number of English books existing on the subject, published between the fifteenth and the present century, is extremely great; every political crisis in which Russia has prominently figured producing its plethora—as, for instance, the period from 1829 to 1833, embracing the Russian campaign in Poland, and the first few years following after the Crimean War. The character of the Russians and their organised life have been so exhaustively treated, that the Russians, it would appear, have no just cause to complain as they do. And if they desire to be more intimately known, in order that European opinions regarding them may be remodelled, then they should endeavour to bring about that social fusion by which means alone one people becomes familiarly acquainted with another. There are, however, so many causes to militate against this, that no attempts, not even those of hosts of paid agents, could possibly make any approach to success. On the contrary, experience has shown that this social estrangement between England and Russia has increased rather than diminished, the repelling causes in Russia being only too palpable—as, for instance, difference of standard of all guiding principles of action; dissimilarity in habits of life; more than discouraging results following almost every attempt that has ever been made to enter into any kind of enterprise in Russia, &c. Is it apathy and indifference with regard to Russia and her domestic affairs which prevail in Europe, or is it something more? Without entering into a lengthy inquiry into this matter, it may be said that Russia is apparently regarded by us in a twofold aspect; one aspect being the governmental, the other being so obscure by the lack of the faculty of assimilating itself to the European model, that on becoming thoroughly well-known by study, it is put away from all further consideration, while the governmental aspect is ever offensively obtruding itself on our notice. And here it may be appropriately observed in the words of an outspoken Scotsman, "Autocracy can only exist in a state of complete isolation. It can have no friendships, for friendships imply sympathy and even equality."* It is impossible to account in any other manner for the indifference to all but sensational things in regard to Russia.

Let us again take the example of any one of those writers on Russia who lament in their opening pages that ignorance which they set themselves to dispel. The accusation of ignorance might perhaps with more justice be brought against those who profess to enlighten us for the first time, evidently ignoring, if not losing sight of the fact, that they are only reiterating for the hundredth time what had already been fully expounded. In the second place, is a reiteration calculated to stimulate that interest which, it is pretended, is so very desirable? But an interest to be beneficial must show itself in a practical form, and a thousand editions of a work may be sold without having the much-desired effect, if the conviction still exist that the repellent causes above alluded to preclude all possibility of social intercourse, which must be based on a reciprocity of interests.

But are the Russians really sincere in the expression of their desire that we should know them better by examining them closer? What are the proofs of this? They have been very faithfully described by many; their characteristics, their social life and organisation, their institutions, their policy, have all been pictured and illustrated with photographic fidelity. And what has been the result? Those who, for the benefit of the world, have so described them, sowing the truth, have only reaped obloquy. You may be told and know all things in Russia, where all with one voice unofficially will complain of the rampant evils in the country; but if reconveyed publicly, your information will be pronounced to be all false, and you yourself will be disavowed by Russian society, which is nothing if it is not official; for every one member of Russian society is respo [illegible] probably aware, for any opinions he may be known to have enunciated, to the third section of His Imperial Majesty's Chancery. Thus the Russians are prone to say, in the same breath, "Know us better and be our friends," and "Preserve us from our friends."

---

* *Russia*, by D. Mackenzie Wallace, M.A., Member of the Imperial Russian Geographical Society. (Cassell, Petter and Galpin, 1877.)

* Dunca [illegible]

Whether Mr. Mackenzie Wallace was induced to visit Russia by what he had heard of that country or by what he had read about it we are not told, but we presume he had no great interest in it when he set out, for we read in the opening lines of his preface that, arriving for the first time in St. Petersburg in March 1870, with the intention of spending merely a few months in Russia, he *unexpectedly* (the italics are not his) found so many interesting subjects of study that he remained for nearly six years. The result of this visit to Russia is a work of undoubted merit; but without fear or favour, we unhesitatingly say that there is nothing new in it, except that it is much better written than any modern work on that country. As a serious work for the student of Russia it is not equal, though it may serve as a corollary, to the standard works in the field of similar inquiries; for the student of facts will assuredly learn more from the Parliamentary Blue Books on the land and peasant questions as they now stand since the emancipation of the serfs. If Mr. Mackenzie Wallace has written merely to entertain, his success, we fear, will be partial and fleeting. He writes cleverly, and everybody will read his book with pleasure and with profit; but putting the entertainment aside, we would caution all those who would make a serious study of his book, and seek to draw from it certain principles for their guidance, that, impartial as he may have endeavoured to be in his investigations, he has placed himself under restraint in all his opinions in reference both to Church and State. He has exercised throughout a most peculiar caution, striving to bear in mind that discretion is the better part of valour; this is because he has been so entirely dependent upon and so greatly indebted to persons who are all of that responsible class already alluded to. He seems to have feared to tread, and yet in a way he has boldly rushed. The result is, most obviously, that while he halts much and tries his best to throw a roseate colour over all he describes, he so strongly confirms the opinions of the several Imperial Commissions that, notwithstanding the most favourable notices of his book which have been sent to Russian papers by English reviewers, he himself, with his evidence, will cause much irritation to his friends, and will perhaps be after all repudiated.

In all cases where Mr. Mackenzie Wallace might properly have founded a deduction, formed an opinion, or ventured a prognostic, he "leaves it to time," "finds it impossible to say," "reserves his judgment," "is not prepared to say," &c. After six years of close scrutiny into the present state of Russia and of retrospective inquiry through the whole of the period since the emancipation of the Russian serf, it would have been very much to the point to have expressed a decided opinion as to the results of that great and glorious act. Travelling over the country as he did, visiting Ivanofkas great and small, having had the benefit of so many oral, verbal, and written illustrations of the working of the various rural systems of peasant self-government, and having, above all, assisted even in commissions of inquiry, and possessing, possibly, more evidence of commissions than we are informed of in his book—Mr. Mackenzie Wallace might surely have shown more courage (there is no question of modesty) than he does in simply giving us half-digested matter. Has Mr. Mackenzie Wallace studied the Blue Books containing Mr. Michell's Reports on Land Tenure in Russia, and others? If he did so, why does he lag behind the opinion of the highest English authority on the subject, officially given?* If he has been assured that a similar truthfulness—a reproduction simply of purely Russian data—would be distasteful, or if he has felt that the plain unvarnished truth would be unwelcome even to those who assisted him in learning it, he may rest assured that his book, as it stands, will nevertheless be regarded in Russia with much disfavour; and reading it, Mr. Mackenzie Wallace's Russian acquaintances and *collaborateurs* will still repeat, "Preserve us from our friends."

That Mr. Mackenzie Wallace has come to know Russia very well is an evident fact; it would, indeed, be doing scant justice to his faculties for observation, and one who is very cautious is ordinarily very 'cute to doubt it. He very pertinently observes, at page 315 of vol. ii., that "testimony, when given to foreigners in Russia, is by no means unbiassed." And, indeed, throughout the whole of his work on Russia we detect a marked vein of disenchantment from the day on which the author first embarked on the ocean of rural life and investigations in Russia. He considers that autocracy was never stronger in Russia than it is now; but reading between the lines, and by the light of much information which Mr. Mackenzie Wallace surely possesses, we see a very melancholy picture in his description of the country of his special study. Reading of the effects of emancipation, of communal self-government, &c., in Russia, the following phrase grates peculiarly on our nerves and tends almost to shake one's faith in the value of that emancipation which should have regenerated Russia. "He (the peasant) must have food for himself and his family, and the rural authorities are threatening *to flog* him or to sell his cow, if he does not pay his arrears." Although Mr. Mackenzie Wallace wavers much in his opinion—from his book we gather positively that the landed proprietors have not improved their material condition since the emancipation; he is bold enough to say that the improvement is not apparent; that as regards the former serf little or no amelioration has taken place in his condition. We do here get so much of an opinion, although, again, "the question is difficult to answer." We would here call Mr. Mackenzie Wallace's attention to the fact that Russian opinions, as expressed in most of the reports of Imperial Commissions and in letters to Russian papers, are more decided than his own and more suggestive.

Where did Mr. Mackenzie Wallace find that the Russian priesthood have been commonly supposed to exercise an enormous influence over the people? We take it that the common opinion in England has been quite the reverse, and we agree with Mr. Mackenzie Wallace that it would be an entire mistake to suppose such a thing. For it is repeatedly urged upon the Russian Government that the effect of the priesthood on the peasantry is demoralising in the extreme, that the churches are all emptying fast, while holy days, drunkenness (zapoyem), theft, and all sorts of immorality are growing frightful, and form the subject of very grave official deliberations.

---

* *Vide* Reports from Her Majesty's Representatives respecting the Tenure of Land in the several Countries of Europe, 1869-70. Parliamentary, 1870 (c. 75).

We have pointed out that an exposition of the true condition of Russia is a most ungrateful task, and we refrain therefore from saying anything more from our own knowledge. We would, however, remark in conclusion, that instead of publishing new books, however readable, containing the results of independent inquiries, it would be quite as well, and perhaps better, to republish the Blue Books on Russia in octavo, and to bring out a digest of all that has been written on Russia either in England, in France, or in Germany, since Russia first came into notice, or played a prominent part in the family of European States, with annotations showing wherein and to what extent Russia has altered and improved.

The following passage, for instance, taken from Duncan's *History of Russia*, 1857, vol. ii., p. 284, might advantageously be corrected up to date. We introduce it as an example, more especially because it bears on what Mr. Mackenzie Wallace wafts as it were in the form of incense in the face of his Russian friends.

"The autocracy of Russia has nothing to fear from the serfs. They are taught by the priests that the Emperor is both a temporal and a spiritual ruler, and that to question his mandates is blasphemy. Much also has been done to ameliorate their condition, and of this they are sensible. Their obedience, therefore, is secured by religion and gratitude, and they indulge the hope of future emancipation. When the absolutism of the Czars is subverted, the blow will have been struck by the aristocracy, as *chiefs of the military force, for simply as an ennobled order they have no weight in the country, no influence over public opinion.*"

ROBERT MICHELL.

THE COUNTRY OF BALOCHISTAN; its Geography, Topography, Ethnology, and History, by *A. W. Hughes, F.R.G.S.* (George Bell & Sons, 1877.)

BALOCHISTAN is a region of which very little is generally known, while its extent and its position give it importance both from a geographical and a political point of view. In modern times the journeys of Pottinger and Christie first supplied accurate knowledge of portions of Balochistan, and this was supplemented by the information collected during the Afghan war, and by Mr. Masson. But Major John Jacob, who became Political Superintendent of the Upper Sindh frontier in 1847, is the man to whom the present connection between Balochistan and British India is due. He it was who founded the now flourishing station of Jacobabad, who negociated the Treaty of 1854, which is still in force, and by whose advice the office of British Resident at Kalat was created in 1856; Sir Henry Green being the first Resident. Since that time the State of Kalat has been a dependent frontier power, and its western boundary towards Persia was recently settled by Sir Frederic Goldsmid. In the present volume Mr. Hughes, whose admirable *Gazetteer of Sindh* has already established his position as an excellent compiler, furnishes a general account of both Persian and Kalati Balochistan. The chapters describing the physical features and products of the country, and those giving general descriptions of the several provinces, are carefully written after a study of all accessible authorities; and they are followed by two chapters on the political history of Balochistan. Mr. Hughes has very appropriately dedicated his little work to Sir William Merewether, the present Commissioner of Sindh, and most worthy successor of Sir John Jacob.

———:o:———

DIE BEVÖLKERUNG DER ERDE. Von *E. Behm and H. Wagner.* IV. (Supplement to Petermann's *Mittheilungen.*)

THIS annual publication is a mine of wealth to all those engaged in statistical inquiries. The authors do not content themselves with giving the results of the latest censuses, but they also notice all changes of boundaries, whether brought about by treaty or otherwise. Estimates of the population of towns or countries incidentally given in books of travel or newspapers are likewise recorded in this valuable annual. The present number contains an elaborate abstract of the Census of India, more complete and trustworthy than official compilations of the same kind. This portion of the volume is illustrated with a population map of India and with a map showing the complicated territorial arrangements in Central India. The latter is based upon a map prepared by Mr. Saunders for Mr. Markham's "Report on the Moral and Material Progress of India," and the authors repeatedly express their obligation to the Geographical Department of the India Office for having communicated to them useful information.

Area and population of the earth are stated to be as follows:

	Area sta. sq. miles.	Population.
Europe	3,830,620	309,178,500
Asia	17,291,140	824,548,500
Africa	11,557,520	199,921,600
Australia & Polynesia	3,423,130	4,748,600
America	15,882,320	85,519,800
Total	51,984,730	1,423,917,000

There are throughout the world, 205 towns of more than 100,000 inhabitants. The most populous of these are London 3,489,428, Paris 1,986,748, New York with Brooklyn, &c., 1,650,000, Berlin 1,045,000, Vienna 1,001,999, Canton, Siang-tau, Singan-fu, and Chang-chan-fu 1,000,000 each, Tientsin 930,000, Calcutta with Howrah 892,429, Philadelphia 817,448, Ching-tu-fu 800,000; Yedo 674,444, St. Petersburg 667,962, Bombay 644,405, Moscow 601,969, Hang-chau-fu (4),800,000, Constantinople, Fu-chow, and Hankais 600,000 each, Glasgow 545,144, Liverpool 521,500, Bangkok, Peking, and Su-chau 500,000 each.

———:o:———

DIE STRÖMUNGEN IM NORD-ATLANTISCHEN OCEAN, mit besonderer Rücksicht auf den Golfstrom. Studie von *Dr. Konrad Jarz.* Vienna, 1877.

IN a pamphlet of 84 pages, Dr. Jarz, formerly an officer of artillery in the Mexican Army and at present a teacher in an Austrian gymnasium, examines the various theories which have been advanced to account for the existence of ocean currents. He first describes the ocean currents of the Atlantic and then discusses their origin, this portion of his work being illustrated by several interesting experiments. In his conclusions he differs widely from his predecessors on the same field of research. Equatorial currents, according to him, originate in the rotation of the earth; meridional currents are due to differences of salinity and evaporation. They are deflected, by the earth's rotation, towards the west, not towards the east. We do not believe that the author will make many converts, but his pamphlet contains much interesting matter, and may be read with profit by all those who make the geography of the sea their special study.

Cartography.

Up to the present time the reduction in the grant for surveying purposes in India does not appear to have affected the rate of publication, for, by last mail, no less than thirty-five new sheets of one-inch maps, besides fifteen sheets of other publications, were received.

Two sheets of the Indian Atlas, already published in outline, have now been issued with the hills.* The only other compiled map is one of the Province of Assam,† with the adjoining native territories. It is evidently reduced from the latest surveys, but the hill features are shown very inadequately, and there is no doubt that a much better map might have been produced. The political boundaries and roads are elaborately coloured, and for general purposes of reference the map must prove very useful.

The Topographical Surveying parties have presented us with seventeen new sheets, executed in the effective manner to which we are accustomed. The Topographical Map of Rajputana‡ has been increased by three sheets, embracing parts of Jeypur, Jodhpur, Kishengarh, and Ajmere, and based upon surveys made in 1873-75, by Captain G. Strahan and assistants. The same officer supplies us with an excellent plan of the city and environs of Ajmere,§ a fine specimen of hill sketching on a large scale in the contoured style; whilst Captain J. R. Wilmer furnishes a less ambitious plan of the Cantonment of Nusseerabad. Six new sheets of the Gwalior and Central India Topographical Survey‖ have been issued, based upon surveys conducted under the superintendence of Capt. G. Strahan. The hills form a fine feature on several of these sheets. The North-Eastern Division of the Central Provinces Topographical Survey¶ presents us with five new sheets, embracing portions of Belaspur, Mandla, Balaghat and other districts, and based upon surveys by Lieut.-Colonel G. C. Depree (1874-5).

We are glad to observe that the officers of the Topographical as well as of the Trigonometrical Surveys have adopted the new and official system of spelling. The Revenue surveyors, on the other hand, persistently cling to the old system, and these maps, as far as nomenclature is concerned, are thus obsolete even at the moment of publication. True, some of the sheets of surveys now in progress may have been already issued when the orthographical edict went forth from Calcutta, but surely this is no reason why the old and condemned system should be persisted in.

The one-inch Revenue map of Goalpara District, Assam,** has been completed by the publication of sheets 14, 15, 17 and 18, from surveys made in 1873-5 by Major D. Macdonald. The map is a favourable specimen of its type. There are shown upon it villages, temples, mosques, police stations, and bazaars, three classes of roads, masonry pillars and mile stones, trigonometrical stations, electric telegraphs, forests, bush, high grass, and three classes of boundaries. The number of altitudes is limited. From a marginal note we learn that the district has an area of 3960·70 square miles. The Punjab Surveyors supply us with a map of the Delhi District* in seven sheets, surveyed in 1872-4 by Captain W. H. Wilkins. The survey of Bhawalpoor† is making steady progress, no less than ten new sheets having recently been published. They exhibit the characteristic features of that extensive Native State—barren sand-hills in the interior, well-cultivated tracts, with numerous towns and villages near the Indus. We are indebted for this survey to Messrs. E. T. S. Johnson and J. Campbell, and to Captain D. E. Andrew.

The Revenue surveyors in the Central Provinces limit their contribution this time to a plan of the Fort of Deogurh in the Chindwara District.‡

The officers of the Trigonometrical Survey in India,§ under the able leadership of Colonel J. T. Walker, supply us with five sheets of levels in the Punjab, the Lower Provinces, and Audh, compiled from canal and other surveys, and combined with the operations of the great Trigonometrical Survey. We trust that the numerous altitudes inserted upon these sheets will find their way into the Topographical and Revenue maps.

We are indebted to Mr. Alexander Murray for a capital Geological Map of Newfoundland,‖ exhibiting no less than twenty-two different formations, all of them clearly indicated by colours and letters. Laurentian and Huronian rocks appear to occupy about one-half the area of the island, whilst the beds of Silurian formation, which overlie them, occupy nearly the whole of the remainder. There are two coal basins, the one near the south-western extremity of the island, the other in the interior, to the north of Grand Pond. The Devonian formation is limited to a small island. Eruptions of volcanic rocks have taken place in the centre of the island, in a direction running from north-east to south-west.

Another edition of the same map indicates the tracts now known to be more or less fit for settlement. In proportion to the area of the island these are but of small extent. They embrace several small patches in the south-eastern peninsula; an extensive tract stretching from Gander Bay southwards to Gander Lake; another considerable tract in the valley of the Exploit River as far as the Indian Lake and the two coal districts. Pines are met with in most of the above. There are, besides, marshlands which might ultimately be brought into cultivation, and which are certainly adapted for grazing cattle.

We have received from General Stone, the chief of the Egyptian staff, a map of the Nile between Dufli and the Albert Nyanza based upon a *reconnaissance* made by Gordon Pasha in July 1876. The map differs from that published previously in several respects. There is no indication now of an arm of the river flowing towards the north-west. We have also received a map of the route from El Obeiyad to El Fasher, the capital of Wadai, based upon a *reconnaissance* made by Major Prout in 1876, and neatly engraved on stone. Fasher is placed, from astronomical observations, in lat. 13° 37′ N., long. 25° 24′ E. Greenwich. Neither of these maps increases to an appreciable extent our general knowledge of the countries they refer to, but they are nevertheless valuable contributions.

E. G. Ravenstein.

---

* Indian Atlas, sheets 2 N.E. and 52 S.E. Calcutta, 1876.

† Province of Assam, 1875, 16 m. = 1 in. Calcutta, 1876.
The same, a photo-lithographic reduction, 24 m. = 1 in.

‡ Rajputana Topographical Survey, 1 in. = 1m. Sheets 54, 55, 56.

§ City and Environs of Ajmere in Rajputana, 1875. Scale, 12 inches to the mile. 4 sheets.
Nusseerabad Cantonment (Ajmere), 6 inches to the mile.

‖ Gwalior and Central India Topographical Survey, 1 m. = 1 in. Sheets 67, 68, 70, 72, 73, 74.

¶ North-Eastern Division of the Central Provinces Topographical Survey, 1 m. = 1 in. Sheets 24, 25, 26, 30, 31.

** Assam Revenue Survey, District Goalpara. Scale, 1 m. = 1 in. Complete in 19 sheets.

* Punjab Revenue Survey, District of Delhi. Scale, 1 m. = 1 in. Complete in 7 sheets. Calcutta, 1876.

† Punjab Revenue Survey, Bhawalpoor State. Scale, 1 m. = 1 in. Sheets 16, 22, 24, 29, 32, 36, 37, 38, 43, 47.

‡ Central Provinces Revenue Survey, Deogurh, District Chindwara. Scale, 12 in. = 1 m.

§ Great Trigonometrical Survey in India, Levels in the Punjab. Sheets 23 and 66.
The same:—Levels in the N.W. Provinces. Sheet 27.
The same:—Levels in Audh. Sheets 28 and 40.

‖ Geological Map of Newfoundland, by Alexander Murray. (Engraved by E. Stanford.)

Log Book.

The Goodenough Memorial.—The Committee of the Memorial Fund which was raised as an expression of admiration for the character of the late Commodore Goodenough, and of the sense of the loss sustained by the Navy at his death, under the presidency of Admiral Sir Hastings Yelverton, has now decided on the form that the memorial shall take. Each year the interest of the bulk of the money subscribed, together with a gold medal, will be presented to the officer who, having been first in seamanship, passes the best examination in gunnery. The management of this trust will be placed in the hands of the Lords of the Admiralty. A bust will also be executed by Count Gleichen, who was an old messmate of Commodore Goodenough in the 'Raleigh,' which will be placed in the Painted Hall at Greenwich.

In Australia, both among the colonists and among the officers and men of the squadron, the love and admiration for Commodore Goodenough has found expression in several ways. The site of the graves of the Commodore and of the two young seamen who died from the same cause has been purchased. A Sailors' Home, called the "Goodenough Naval House," has been established at Sydney, and a marble bust has been executed for subscribers among the people of New South Wales.

The Dutch Sumatran Expedition.—The members of the Sumatran Expedition left the Helder, on board the fine steamer 'Conrad,' on the 13th of January, 1877, reaching Port Said on the 1st, and expecting to arrive on the 22nd of February. Here they will be met by a civilian well acquainted with the people and the Malay dialect of Sumatra, who will conduct the ethnological and linguistic researches. Lieutenant Schouw Santvoort, the commander of the Expedition, proceeds to Batavia for the steam-launch, which has already been sent out in pieces. She will be towed to the mouth of the Jambi River, where a depôt of coals will be formed.

The Dutch Geographical Society has published a very able memoir by Lieutenant Schouw Santvoort, on all that is now known of the region to be explored, with a map compiled from all existing materials; showing what is to be considered as quite unknown, and what as already explored. An appendix contains extracts from the writings of former English and Dutch authorities, including the journal of Barnes, from a manuscript preserved in the Geographical Department of the English India Office. Thus nothing has been neglected to make this Expedition as complete as possible, both as regards the thorough investigation of all that had previously been done in that part of Sumatra, and the equipment for present work.

Miklukho Maclai on New Guinea. After an extended tour through the Malay peninsula, this Russian traveller visited Yap, Palao and other islands of the Pacific, and then proceeded in the schooner 'Seabird' to his old quarters on the coast of New Guinea. He landed and met with a friendly reception on the part of the natives. They declared that they had confidently looked forward to his return. No vessel had been seen by them since the departure of the 'Izumrud' in December, 1872. An earthquake occurred a few months afterwards, destroying many villages in the hills. In conversing with the natives he found that they had not forgotten the Russian words he had taught them during his previous visit. They readily assisted him in building a house. M. Maclai has taken with him seeds and cuttings of fruit-trees. The maize, introduced by him in 1872, is doing well.

A Russian man-of-war has been instructed to call for the intrepid traveller.

New Sanjaks in Turkey.—Several changes have taken place recently in the political divisions of Turkey. The archipelago has been separated from the vilayet of the Dardanelles, and the new "Vilayet of the Islands" now includes the islands in the Ægean and Cyprus, with Rhodes for its capital. The new vilayet of Constantinople includes the capital, the sanjak of Izmid in Asia Minor, Chatalje, and the Dardanelles. Constantinople itself has been divided into twenty municipal districts, embracing both shores of the Bosphorus and the Princess Islands. In 18 of these districts there are 529 streets and 62,262 houses, and making an allowance for the two others, and assuming that there are ten inhabitants to a house, its population would amount to 691,800 souls. The new vilayet of Kosova includes the sanjaks of Nish, Prizren, Uskub, and Yeni Bazar. The new sanjak of Prishtina includes the kara of that name and several others. The vilayet of Monastir has ceased to exist, it now belongs to Saloniki. The sanjak of Sofia has been incorporated with the vilayet of Adrianople. The Herzegovina has been reunited with Bosnia.

We learn from Lutfi's *History of the Russo-Turkish War of* 1828-29, published recently, that a careful census of the population of Constantinople and its suburbs was taken whilst the Russians blockaded the Dardanelles and the Bosphorus. There were 359,089 souls. This is the only census taken during the present century. Dr. Mordtmann made a careful estimate in 1873 (*Gazette Médicale de l'Orient*, February 1873), based upon the bills of mortality, and estimated the population at 600,000 souls at most. The increase is almost exclusively amongst the Christians, for at the time of the census nearly all the Greeks and many Europeans had left the town. Besides this, there are at present many quarters of the town which were inhabited formerly by Turks but are now in the exclusive possession of Christians.

The Portuguese in Africa.—The Portuguese appear to exhibit an unwonted activity in connection with their African settlements. On the west coast they claim the exclusive navigation of the Congo, and are charged with the design of desiring to appropriate Ambrizette, Landama, and Bandana. An expedition of 120 men left Lisbon on the 11th of December for the east coast, supplied with scientific instruments, arms, stores of every kind, and nineteen wooden houses, to be erected at Lorenzo Marques in Delagoa Bay. Amongst the men of the expedition are twelve carpenters, thirteen masons, three smiths, four sawyers, and thirty military workmen, and they are divided into three detachments, to each of which a surgeon has been attached. The sum of 89,000*l.* has been granted by the Portuguese Government to be expended in public works in the course of 1877.—*Exploration.*

Piaggia's Survey of Lake Ibrahim.—Dr. Petermann has received a map of Lake Ibrahim, sent to him by Carlo Piaggia. This traveller accompanied Gessi's expedition from Dufli to Lake Albert in 1876, and then ascended the Somerset Nile to Mruli, whence he made a complete examination of the lake discovered by Long and named by him L. Ibrahim. Piaggia has made a special map of the lake, which, it appears, is from 32 to 35 miles long from N.N.W. to S.S.E., and 12 to 15 miles in breadth. Its south-western half is studded with islands, while the opposite portion is free from them. The Somerset Nile enters the lake on the north-west (?), and soon emerges again from the northern extremity. Piaggia discovered what he believed to be a second outlet on the north-eastern side, which after a short course loses itself in a network of swamps, and which he accordingly named Massanga. He ventures the theory that it eventually either discharges into the Sobat or into the White Nile by the Makedo Cataracts near Dufli, but it is more probable that this apparent outlet is only a sort of swampy backwater formed during the rainy season, and of no great extent.

Geographical Prize Essays. The Geographical Society of Antwerp offers two prizes of £20 each for memoirs on the following subjects:—

1. History of a Belgian traveller, born or connected by family ties with the province of Antwerp, whose works and discoveries have contributed to the progress of geography. Attention is drawn to Pierre van den Broecke, born at Antwerp about 1580; John Baptist Grammaye, born toward the close of the sixteenth century; Jacques André Cobbe, born in 1682; and Francis Balthasar Solvyns, born in 1760.
2. A description of the Azores (Vlaamsche Eilanden), and history of their colonisation from a Belgian standpoint.

The memoirs must be written in French or Flemish, and must reach the secretary of the Society (37, Rue van Lerius, Antwerp) not later than 31st December, 1877.

Correspondence.

—:o:—

PROVISION OF CHARTS AND SAILING DIRECTIONS FOR GOVERNMENT TRANSPORTS.

To the Editor of the "Geographical Magazine."

Sir,—I forward the following extract from the *Bombay Gazette* Overland Summary of 22nd September, and, concurring entirely with the remarks made on the case, I wish to make some additions of my own to them:

"The 'John Starr' was a large barque bound to Karáchi with a full cargo of porter and railway iron, the property of the Indian Government, and was wrecked on the coast about 9 miles to S.E. of that port on the 1st of last month in long. 67° 2′, lat. 24° 40′. A Court of Inquiry, composed of the Town Magistrate and a master of a merchant-ship, has been held, the [illegible] ich is 'that it did not consider the [illegible] e attributable to the master so grave as to call for the suspension of his certificate,' which was accordingly restored to him.

"We propose to make some comments on this case rather with a view to the benefit of future navigators than with a feeling of harshness to the master, who narrowly escaped with his life, and who, after the catastrophe, appears to have acted with judgment. The following points, some only of which are referred to in the judgment, are those to which we would draw attention: The ship appears from the evidence to have been navigated with *only one chronometer*, notwithstanding which—the far from clear weather, the known lowness of the land southward of Karáchi, and the fine direction bank of soundings extending for 60 miles off that place—no attempt was made to verify the position by taking a cast of the lead, although even, according to the supposed position, the ship was in soundings before noon. Further, the sailing directions all caution a vessel to expect a S.E. current at this season; no allowance was made for this in the course steered. The sailing directions also order a vessel to steer for Cape Monze at this season, and thence to make the port. The course steered at noon from his supposed position should therefore have been fully two points more northerly, to comply with this advice. Either of these three precautions would have saved the ship. The first is the most ordinary step on approaching a coast, and the navigator's conduct was the less excusable in this case as the discolouration of the water must have been very marked for at least an hour before the vessel struck. The other two are clearly indicated by the sailing directions. As land appears to have been visible for some time, it is obvious that there was no such thickness of weather as to account for the disaster—we cannot admit the term accident—and certainly the lead might then have been hove. There does not appear, from the published decision, that any inquiry was made on one most important point. Was the ship or was she not provided with the proper charts and sailing directions for the locality, or had she even an obsolete Horsburgh? Was her chart only one of those general charts of the Indian Ocean bound with blue and sold by an irresponsible ship chandler? It seems inconceivable that the sailing directions and soundings of the charts should have been so ignored, had they been on board. Lastly, if she had not these indispensable requisites for safe navigation, who is responsible for sending a valuable Government cargo in a ship unprovided with these articles to be utterly cast away for the want of them? Surely it must be some one's duty at the India Office to ascertain that ships conveying Government cargo are properly found in this respect. We insist on this point the more as we have heard non-officially that the 'John Starr' was *not* provided with the proper charts and directions. We believe that, on the survey of a ship when taken up by Government, investigation is made on all points except the instruments of navigation. Why should not a stipulation be made in the charter-party that the ship shall be provided with at least two good chronometers and the proper Admiralty charts and sailing instructions? or, if that cannot be done, it might be worth while for Government to expend the few shillings required for the charts, &c., and supply them gratis to the master, especially as it is at no other expense for insurance."

I would especially here draw attention to the concluding paragraph, in the first instance, and ask seriously whether any care, precaution, inquiry, stipulation, &c., are made when a ship is chartered by Government as to her charts and chronometers, or whether it is left to the master to make such provision as he may think sufficient? If Government do not, do insurance companies ever ask such questions, for they are largely interested? It is a curious anomaly if they do not. Royal Navy vessels are not allowed to say what charts they will have; if they go to a certain part of the world, they must take certain charts and sailing directions: why not apply the rule to Government transports? The question is most important, and we earnestly invite attention to it.

Now a few words as to the cause of the wreck. If the *one* chronometer had *not* been 20 miles out, the wreck would certainly not have happened; but the master should have assumed that such an error *might* exist, and should have allowed some margin in the course steered accordingly. The less intelligent class of navigators cannot be too often reminded that chronometers are not infallible, are liable to sudden alterations, and that the result of a solitary chronometer must be received with a certain amount of reserve. There is too great a tendency to accept the result of the day's calculations as an absolute certainty.

I am, &c.,
ARTHUR W. STIFFE.

———:o:———

THE PECHENEGS.

To the Editor of the "GEOGRAPHICAL MAGAZINE."

SIR,—The researches of Mr. Howorth are, in spite of the seemingly dry character of the subject, of an undoubted ethnographical value, inasmuch as they bring together facts and analogies of *nomina propria*, hitherto either not sufficiently or not at all regarded as the ethnical classification of the Turks. His newest identification of the Kangli and Pechenegs with the Karakalpaks of to-day, is more than a mere combination, since there is a tradition amongst the Karakalpaks of the Lower Oxus that their ancestors have founded the city of Kazan many hundred years before, and that their migration to Central Asia took place only after the total collapse of the Golden Horde. This is certainly more than a tale, for, in absence of linguistical proofs, the physical peculiarities of the Karakalpaks of to-day give the best link of connection between the Turks known in the tenth and eleventh centuries and their direct offshoot, the Karakalpaks.

Mr. Howorth is anxious to know the meaning of the word Pecheneg or Beshenek, the more ancient mode of spelling. I beg leave to make the following suggestion: I find the spelling of Porphyrogenitos—viz., *Patrinak*, to be nearest to the truth. The Greeks being unable to pronounce the *sh*, we find it substituted by *tr*, restoring consequently the original *bashinak*, *i.e.*, chief (*bash*) prince (*inak*): and thus we have the meaning of the nomen adopted by the whole tribe.

I remain, yours faithfully,
A. VAMBERY,

THE UNIVERSITY, BUDA-PESTH,
February 7th, 1877.

———:o:———

THE RUSSIAN EXPEDITION TO THE ALAI AND PAMIR IN 1876.

To the Editor of the "GEOGRAPHICAL MAGAZINE."

SIR,—In the report of the proceedings of the Royal Geographical Society's meeting held on the 8th January last, given in your February number, I am represented as having said that the men connected with my mission went from Chatir-Kul across to Wood's Lake, down to Kilapanja and back to Yarkand. This is an error of the reporter. Instead of Chatir-Kul it should have been Yangi Hissar, from which place Col. Gordon's party started across the Pamir to Wakhan. I should like also to correct a former portion of the report of my remarks, which were misunderstood at the time. When two such eminent authorities as Sir Henry Rawlinson and Col. Yule agree on a matter of geography, it would have been presumption in any one to oppose a different opinion, and on the question of the route of Ptolemy's merchant I did not venture to give a suggestion. But from personal observation, and from all the authorities I had been able to consult, I was and still am of opinion that *a* great trade route existed between Khokand and Kashghar over the Terek Pass from very ancient times. Further than this I hazard no opinion which can be taken to oppose the line taken up by Sir Henry Rawlinson and Col. Yule for Ptolemy's Merchant.

Yours, &c.,
T. DOUGLAS FORSYTH.

44, ONSLOW SQUARE,
6th February, 1877.

Proceedings of Geographical Societies.

———:o:———

ROYAL GEOGRAPHICAL SOCIETY.

Meeting of January 22nd, 1877.

SIR RUTHERFORD ALCOCK, K.C.B., President, took the Chair at 8.30 P.M. The paper of the evening was by the Rev. DR. MULLENS,

ON RECENT JOURNEYS IN MADAGASCAR.

Within the last two years no less than five important journeys have been made by English missionaries over entirely new ground in Madagascar. The first was undertaken by Mr. Shaw, Superintendent of the Normal School in Fianarantsoa to the kingdom of Ikongo in the south-east part of the island. The country through which he passed was one vast uninhabited forest, which Mr. Shaw describes as the thickest he had seen in Madagascar. Birds were the only living things met with, though there were evident traces of wild hogs. About the centre of this forest a pair of curiously shaped mountains rose far above the surface of the plain; the northern sides rise precipitously from the plain to a height of 1000 feet, and the south and west sides are covered with thick brushwood. On the ridge between these two hills the travellers had a splendid view to the south-east. A deep valley lay before them with the hills rising high on the opposite side, all densely covered with trees; and from near the summit of one of them a large stream came tumbling and roaring into the valley. Just before emerging from the forest a slight shower came on which brought down from the overhanging leaves and grass minute leeches. These creatures are able to elongate themselves to nearly four times their natural length; they bite very severely, and cling to the legs and feet most tenaciously. From the summit of a hill overlooking Ambohitsivalana, Mr. Shaw obtained a good view of Ikongo. It consists of a long flat-topped hill, about 5 miles in length and about 1000 to 1500 feet above the level of the plain. Five towns were seen on the summit, the one to the south having some good-sized houses. Near this southern town two streams take their rise, flowing along the entire length of the hill, descending in a clearly defined cascade near the northern extremity. Mr. Shaw was well received by the king, and it was arranged that teachers should be sent to instruct his people. In June 1875 Mr. Shaw took out the teachers, with whom the king was much pleased, providing them with a house, and his people agreeing to furnish them with rice. On his return Mr. Shaw was permitted to travel by the southern road, thus enabling him to see the whole of the Ikongo country.

The second journey described was to the Ibara tribes, which was made by Messrs. Shaw and Riordan in April last. These tribes live to the south and south-west borders of the Betsileo province. Starting from Ambohimandroso they entered the Ibara Land at the south end of the Betsileo province, and travelling westward crossed the ridge which bounds on the west the great rice plain and also the valley of the Tsimandao. Passing through the granite range called Andringitra they were struck with the wonderful forms, size, and number of the granite masses of which the ridge is composed. Journeying west and south through the well-watered valley of the Isahanambo, they came to Besikaona, which is situated at the entrance of an extensive and level tract of country, extending 30 to 40 miles south, and double that distance east and west. This plain is crossed and recrossed by the Menarahaka river, which rises to the east of the ridge east of Besikaona, and after traversing nearly the whole length of the valley turns south, then east to a point as far as its own sources. Continuing the journey west, Messrs. Shaw and Riordan came to the valley of the Central Ibara, with Ihosy as its chief town. This town stands in the centre of an extensive valley, through which the River Ihosy runs from south to north in its course to the Tsimandao. As far as the eye can reach the country appears to be inhabited, containing about 16 villages. Beyond this district to the south, north, and west is an uninhabited desert, and to the east there are very few inhabitants. Two or three of the kings visited the travellers, and opportunity was taken of speaking to them concerning the ignorance of their people, and their condition contrasted with that of their neighbours the Betsileo, on which they promised to bring about a better state of things. Returning to the eastward, in the neighbourhood of Akaramena, Messrs. Shaw and Riordan passed one of those peculiar rocks in which the graves of the kings have been hewn at a great distance from the ground, the coffins being placed in the back part of the crevice, with the skulls of bullocks in the fore part. With a view to visit the southern Ibara they returned to the granite ridge of Andringitra, near the north end of which they found an extinct crater. Passing south they came into the valley of the Menarahaka and from thence on to Ivohibe, which is considered one of the wonders of Southern Madagascar. It is an enormous isolated mountain, with a level top, standing in the centre of a broad plain, beyond and apparently below the Menarahaka Valley and forming the next terrace towards the south. In appearance and character it is like the fortress-rock of Ikongo, having a lake of spring water on its summit, which overflows and forms a considerable cascade on the northern side. In this plain Mr. Shaw found the best population he had seen in the Ibara. Here his presence caused great excitement, the people rushing out *en masse* to see the Englishman. He was allowed to choose what house he liked, and was plentifully supplied with provisions, &c. Both among the Southern and Central Ibara the way was prepared for the establishment of schools and for free intercourse with other parts of the country.

South-east Madagascar was the scene of the third journey. This was undertaken by Messrs. Sibree and Street in June and July last. They travelled over a great deal of new ground, and careful observations were taken by Mr. Sibree along the route pursued. The new portion of their journey was commenced at the south-east corner of the Betsileo Province, from the hill town of Imahazony. In three hours they entered the forest, the luxuriance of the vegetation of which they greatly admired, and the scene which opened before them on coming out is described as one of the grandest that can be imagined. The principal valley down which they had come opened into a great hollow or bay, 3 or 4 miles across, and more than twice as long, running into the higher level of the country from which they had descended. The hills or rather edges of the upper level rise steeply all round this great bay covered with wood to their summits, which are from 2000 to 3000 feet above the valley. Between these bold headlands four or five waterfalls were counted, two of them falling several hundred feet down perpendicular faces of rock. Between the opening points of this valley could be seen a comparatively level undulating country, with patches of wood, and the windings of the River Matitanana. Proceeding towards the coast along the valley of this river they passed from the districts held by the Tantala, —who are a simple and friendly people—into those of the Taimoro tribes. The country all about is delightful. At the Hova Fort of Ambohipeno Mr. Sibree took the opportunity to get bearings of the neighbouring villages, and on his way to and from the observing-ground met with great numbers and varieties of butterflies, a rich harvest for the entomologist. They were surprised to find in one of the villages (Ivatomasina), where the Arab influence is said to have been very strong in former times, that the people are said to be descendants of Abraham, and altogether Jews, and have many customs derived from the Jews; but what these were could not be ascertained. There is no doubt, however, that the Arabs have at some former time had a settlement here and on some other parts of this south-east coast, and to some extent taught the use of the Arabic letters, which probably gave rise to the statement in some old works on Madagascar that Malagary was a dialect of Arabic.

From Ambohipeno they journeyed south with the view of visiting the Hova Forts of Mahamanina, Ankarana, and Vangaindrano, of which and the surrounding country an interesting description was given. At several points both on the outward and return journeys Messrs. Sibree and Street observed masses of trap rock, scoria, lava streams, and the like, bearing evidence that the volcanic eruptions so patent in the north and centre of the island have not been wanting in its southern districts. Passing a village called Loharano, they came to an extensive lagoon, which appeared to be the first from the south of that remarkable series bordering the shore, and extending northwards, with few breaks, a distance of 200 miles. Along the southern side of this lagoon are enormous blocks of lava rock. Journeying along the sea coast, they at length reached the Mananjara River, and passing one or two towns of interest, arrived at Ambohimanga, the capital of the Northern Tanala, which is situated about 2000 feet above the sea level, where they spent two days. From this resting-place the journey to the capital was easy.

The fourth fourney was to the Western Sakalavas, undertaken by Messrs. Sewell and Pickersgill in June 1875. The starting-point was Mahatsinjo, near Lake Itasy. They had not travelled many hours before all trace of human habitation was lost, and, crossing the River Sakay, an extensive tract of waste land presented itself, covered with long grass, which proved very trying to their feet. Several military stations were passed on the road, at a few of which a short halt was made; but the road all the way presented few objects of interest Crossing the Manambolo, which is described as a really fine river, the road was tolerably level, very often presenting park-like scenery. Here the country seemed to be quite free from the drizzling rains so common in the east during the winter, producing a great effect on the character of the vegetation. Tamarind trees were conspicuous by their rich foliage; one was found to be 30 yards in diameter, and there were many whose branches extended over a space of 20 yards in width. From Ankavandra they journeyed south to Imanandaza and crossed the Itondy River, which forms a very important branch of the Manambolo, and is surrounded with luxuriant vegetation. For a while they were quite at a loss to know how to get through the tall prickly reeds, which, with a small but deep stream of water, seemed effectually to stop their progress. All the rivers from the Sakay, a long way to the north of Itasy, to the Mania, a large river which flows through the country of the Betsileo, unite in one great river, about 30 miles to the south-west of Imanandaza. At this town Mr. Pickersgill was engaged attending to the sick, fever being very prevalent during the greater part of the year in these low places. Another wearisome journey of four days, under a hot sun, brought them again to Mandridrano, from whence they had set out.

The fifth and last journey was through the Anativolo to Sihanaka west, undertaken in June last by Messrs. Moss and Lord. Anativolo marks the first great fall in the ground on the north side of the central plateau. The plain is shut in east, west, and south, by lofty hills, and extends northwards, with alternations of low and rising ground, at a mean elevation of from 3000 to 3200 feet above the sea, as far as Ambodiamontana. The soil of the whole extent of this large district is of sandy alluvium and red porous clay, easily disintegrated by the action of wind and rain. In many places were seen whole hill sides that had been eaten and washed away by the tropical currents, forming precipices sometimes a thousand feet in depth, and chasms in whose shelter luxuriant forest trees find a congenial habitat, and in which frequently large herds of cattle are fenced off and protected from the cold. Farming and the cultivation of rice, sugar-cane, and manioc form the chief occupations of the people. Crossing the River Mananara, they encamped at the foot of one of the great hills of the northern districts, Voambohitra, which is a magnificent basaltic mass, towering grandly to some 2000 feet above the plain; its summit is reckoned at about 4500 feet above the sea, and in general appearance it resembles Table Mountain at the Cape of Good Hope. At Morafeno, a few miles beyond to the eastward, they encamped on the banks of the Betsiboka, and next day reached the important Hova Fort of Antongodrahoja, which stands on the very verge of a high table-land, and at a height of 4150 feet above the sea, commanding a most magnificent view. From here the ground descends by a precipitous path some 2000 feet to the plain below, after which a good road leads to Trabonjy and thence to Mojunga. Close to it on the east, is the peak of Namakia. It is a place of considerable importance; the people are unusually intelligent, compared with those of other towns, and the rustling of silk dresses, and the display of French hats in the little settlement church, were associated with a fair knowledge of the latest hymns, and a most hospitable and kindly welcome to those who had come to instruct them.

In passing from Antongodrahoja to the Sihamka country the travellers retraced their steps to Tanifotsy, and then eastward. The people met with on the route were lamentably ignorant, and at the village of Antsampandrano the little population of 200, including several soldiers, were so terrified at the sight of two live Englishmen, that they ran away. After resting at Amparafaravola they preferred to cross the Alaotra Lake, which proved a perilous voyage. At last they landed at Antanibao, which is a "strange, uncanny sort of a place." The people are utterly heathen, and many of them had never before seen a white man.

In the discussion which followed the reading of the paper, the Rev. J. Pillans said all the movements of civilisation and progress in Madagascar had spread from the centre, and the value of what was taking place in the island would depend very much on what was going on in Antanarivo, the capital city, which had a population of about 80,000. That city was to Madagascar even more than what Paris was to France. All kinds of movements began there and spread throughout the country. The great centre of life at present was in the mountains, the capital being situated on a hill 4500 feet high, surrounded by a plain at a level of 4000 feet. It had been supposed by some persons that as civilisation progressed the centre of life might change, and come down to the great plains and seaports. He was glad to be able to say that education, with which the great modern movement in Madagascar began, continued to spread wherever the Hovas' influence was felt. As far as circumstances permitted, the Hovas and the Betsileo people were industrious, and worked hard in their rice-fields; but a great many things prevented the growth of their industry. There were no roads through the island, and even in the capital itself the roads were of the rudest description. There was thus no means of transporting their produce from one district to another. Besides this, there were no beasts of burden except a few scores of Mauritius ponies and a few bullocks and a donkey. There was thus no opportunity for the development of industry. Up to the present time the Government had been afraid that outsiders were very eager to get possession of the country, and they had refrained from making roads, so that any army coming from the coast might find transport very difficult; formerly, however, there was a road leading to the east coast. In one or two ways the people might be helped by foreigners. The country was not particularly rich either in its fauna or its flora. Their chief culture was rice, but they were in want of crops that would grow in the upper parts of the country. Then, they had no sheep. Formerly they had sheep without wool on them, but if they could get sheep whose wool would supply them with clothing, it would be a great boon to the people in the cold highlands. He did not think that the country itself was very tempting to capitalists, and the Government were rather jealous of such people.

Sir Bartle Frere said he had only seen Madagascar at two or three points on the north-west coast, at Mojunga and Nossibé, but all present would agree that very few pictures of such extraordinary interest had been presented to the Geographical Society as that to which they had just listened, regarding the great changes which had been wrought in Madagascar since it was first opened to Europeans by the exertions of the missionary Ellis and his brethren and successors. In the days of Marco Polo, Madagascar occupied a very large part of the attention of travellers in the East. From what was stated by Colonel Yule in his excellent notes to *Marco Polo*, it was clear that the Arabs of those days had a great deal of intercourse with the coast of Madagascar; and he believed Dr. Mullens was of opinion that there was some foundation for the tradition that Arab intercourse had existed from the days of the early Phœnician traders. Such tales as those of the enormous roc, whose feathers were 30 feet long, had their origin in the stories brought home by Arab travellers to the Madagascar coast. Why this intercourse was interrupted so completely was one of the curious problems of history, which, no doubt, some of Dr. Mullens' friends would in time elucidate. Apparently, from the date of the commencement of European domination in the neighbouring seas, Madagascar declined in civilisation; but when, about the beginning of the present century, interest was again attracted to the country by a Scotch gentleman, who first induced the missionaries to go there, a slow awakening again commenced, and of late years it had been accelerated in a most extraordinary manner. When it was remembered that a written European character had been given to the language, that books had been printed in the native language, that the country had been opened up to missionaries, that the governing classes had been brought over to the side of Christianity, and that European travellers could now pass through all parts of the island, it must be acknowledged that a tolerably good piece of work had been done in one generation. Indian traders had again begun to resort to the coasts. At Mojunga he found as many as forty houses belonging to Muhammadan traders of Indian origin, and having their head-quarters in India. In this way the country was being penetrated in every direction, and it offered one of the most tempting fields for discovery that were now open. Naturalists would there be rewarded by finding the remains of animals now extinct, and the flora was also very interesting. A great part of the island was still a blank as far as the map was concerned, and discoveries might possibly yet be made as great as those which had rewarded the exertions of the missionary travellers. He hoped that among other channels for doing good, the missionaries would not forget to prosecute geographical investigations, in which they had already so successfully laboured.

The PRESIDENT, in conclusion, said the Paper had deeply interested him, as showing how geographical exploration led by a natural and simple process to the introduction of Christianity and civilisation. That was the legitimate course of things, and it was most gratifying to hear how kindly and well disposed the natives were. They even exceeded the old Castilian Hidalgo's hospitality, when the whole house was placed at the disposal of a visitor, for in Madagascar, the natives said to strangers, "The whole town is yours," and they provided everything that was required. He should be very sorry to think that the old influences that used to prevail in Madagascar would ever turn the kindly blood of these people into the viciousness that had been developed elsewhere. Certainly the progress made in the present generation was most encouraging and gratifying. The desire of the people for improvement was one of the most hopeful symptoms. No doubt it was rather unpleasant walking to the village of Aviavo, and having thirty leeches adhering to the foot; but after all the village itself appeared to be a pleasant place, and visitors had a pleasant reception. The paper showed how much might be done when a right course was adopted, and when there was a continuous effort to carry the beneficial influences of civilisation, apart from its vices, into the midst of a simple and comparatively uncivilised people. There was no more encouraging example, in the whole course of missionary enterprise, than that presented in Madagascar since, in 1816, Sir Robert Falconer, the then Governor of Mauritius, first attracted the attention of England to the island as a promising field for missionary exertion.

:o:

PARIS GEOGRAPHICAL SOCIETY.

December 6th, 1876.—M MALTE BRUN in the chair.—M. BABINET asked whether there was any truth about the discovery of a branch of the Nile flowing towards the north-west. M. MAUNOIR said that Colonel Gordon, in the correspondence he had carried on with him, had said nothing to confirm the assertion.

M. G. REY read a letter received from Commandant L. Chambeyron, in which were described the coral reefs and islands of New Caledonia.

M. VIOLET D'AOUST read a paper on the mountain systems of Central America, and the dust whirlwinds observed by him on the plains of Mexico.

January 3rd, 1877.—M. MALTE-BRUN in the chair. M. GEORGES BIARD announced that the Society for organising "Voyages d'études" around the world had now been established, and that the first expedition would start in May next.

MM. DECHY informed the Society that a copy of the magnificent planisphere by Pierre Descellier, which had attracted so much attention at the Geographical Congress, was being prepared by him.

M. LUCAS DE PESLOUAN announced his approaching departure for Buenos Ayres.

Mr. D. H. T. MOSSE, of San Francisco, in criticising Captain Roudaire's scheme of creating an inland lake to the south of Algeria, said that the displacement of the water required to fill this lake of 6250 square miles would result in a shifting of the earth's axis!

Several communications bearing upon the expedition of MM. Largeau and Say were read. The Agha of Tugurt promised to assist these explorers to the best of his power. General Chanzy, the Governor of Algeria, thought that in consequence of the events now taking place in Turkey, the moment for attempting to penetrate amongst the fanatical Muhammadan tribes of the Sahara was ill-chosen.

M. Largeau has bound himself not to assume the character of an agent of the French Government, nor to meddle with the politics or the religion of the tribes whom he may visit. He proposes to spend the coming summer in the Algerian Sahara.

M. RAFFRAY, the entomologist informed the Society that he is about to leave Java for Celebes and New Guinea.

M. DUVEYRIER read a letter received from Dr. Holub, at present in South Africa. That traveller has explored the country between Natal and the Zambesi; he claims to have ascertained that there are five species of elephants and numerous species of rhinoceros in Southern Africa.

Captain DU TREUIL DE RHINS, in command of one of the King of Anam's steamers, informed the Society that he has surveyed the harbour aud river of Hué. That city stands on an island, and was fortified by Colonel Ollivier during the last century. It is surrounded by a square wall, each side of which has a length of 7316 ft. and defended by a ditch 130 ft. wide, and by a glacis sloping down to the river, which is from 130 to 660 ft. in width.

M. BLANCHET explained his scheme of an inter-oceanic canal across the Lake of Nicaragua.

January 17th, 1877.—M. E. LEVASSEUR in the chair. The President announced that the receipts during last year amounted to 68,937 frs., and the expenditure to 63,253 frs. The ministry of education had granted them an annual subsidy of 1000 frs. in return for 50 copies of their *Bulletin*.

M. A. GERMAIN reminded the meeting that, on the 15th of March last, he had placed before them a Memoir by Colonel Coatpont, which recommended the introduction of Lambert's Equivalent Zenithal Projection when it was a question of representing an extensive portion of the globe. He now placed before them a map of Asia and Europe, drawn on that projection. Lambert's Zenithal Projection resulted in a far less amount of distortion than did those of Sanson or Bonne, ordinarily employed in our maps of continents. He thought that the compilers of maps had not hitherto sufficiently considered the advantages which particular projections offered, and should like to see a greater variety introduced into our atlases.

M. LEVASSEUR concurred. The zenithal projection certainly possessed great advantages in many instances.

M. LEUILLET announced the receipt of twelve plans of stations on the east coast of Madagascar, which he had explored last year. He was engaged at present in preparing an account of his explorations.

January 26th, 1877.—Admiral DE LA RONCIERE in the chair. The President stated that the meeting had been convened in order to welcome Captain V. Lovett Cameron, the only European, with the exception of Livingstone, who had traversed the whole of Africa from east to west.

Captain CAMERON then gave an account of his explorations, in French. He was frequently interrupted by applause, and before separating the president announced that the gold medal of the Society had been awarded to the intrepid explorer.

On the 27th, Captain Cameron was entertained at a dinner, when the bill of fare included fillet of venison *à la Kassongo* and lobsters *à l'Africaine*.

GEOGRAPHICAL SOCIETY OF LYONS.

December 2nd, 1876.—M. DUFONCHEL explained his scheme of a Saharan railway, which was to connect Algeria with Timbuktu. The Sudan had no less than fifty millions of inhabitants, and a climate equal to that of Bengal or the Brazils. Yet, its exports were only trifling, for everything had to be carried on the backs of camels or of men, and the cost of transport was extravagantly high. At Tuat three loads of dates were given in exchange for one of barley, whilst at Algiers the reverse was the case, one load of dates being equivalent to three loads of barley. A railway, affording facile means of transport, would reduce these differences to a minimum, and all the world would profit thereby. The sands of the Sahara, it was said, would overwhelm the proposed railway, but the same thing had been said about the Suez Canal, and this difficulty could be overcome by engineers. Artesian wells would furnish an ample supply of water.

BORDEAUX SOCIETY OF COMMERCIAL GEOGRAPHY.

THE annual meeting was held on the 29th of January. M. MARC MAUREL, the President, felicitated the members upon the support which they had received from the Chamber of Commerce. He recommended the proposition that young merchants should be permitted to visit foreign ports on board a government vessel, as tending to the development of French commerce. From the Report read by Dr. AZAM, it appears that the work of the Society has almost exclusively been directed to local questions. Industrial, geological, and agricultural maps of the Department have been published by it; prizes have been offered to local schools; scientific excursions have been made; questions calculated to promote the commerce of Bordeaux have been considered, and there have not been wanting instructive lectures on a variety of geographical subjects.

VIENNA GEOGRAPHICAL SOCIETY.

Annual Meeting, December 12th, 1876.

The meeting was exclusively engaged upon the reelection of the Council and various business arrangements. Professor von Hochstetter remains president. It was resolved, with a view to an improvement of the financial position of the Society, to create a class of "Extraordinary members," paying an annual subscription of 10 florins.

Professor von Hochstetter's report on the progress of geography, will appear in the January number of the *Mittheilungen*, but was not read.

HAMBURG GEOGRAPHICAL SOCIETY.

February 1st, 1877.—Dr. HARMS in the chair. Herr FRIEDRICHSEN gave an account of the explorations of Dr. Lenz and Dr. Pogge, who had returned to Hamburg on the 27th January, and read a letter from Herr Mohr, dated Dondo, October 9th.

Dr. HARMS read a necrological notice on the late Professor Poggendorf, born at Hamburg, December 29th, 1796, died January 24th, 1877.

Professor SADEBECK read a paper on the genetical connection between the vegetation of the Polar Regions and the forest regions of the northern hemisphere.

Herr CRAMER exhibited relief maps of the Grindelwald and the St. Gothard, and Herr WICHMANN a manuscript map of the British Islands, which figured in last year's International Exhibition at Kensington.

EGYPTIAN GEOGRAPHICAL SOCIETY.

February 2nd, 1877.—General STONE-PASHA in the chair. The Marquis DE COMPIEGNE said that the moral influence of the Society was steadily on the increase. Their scientific collection had been enriched by weapons and other articles presented by officers of the staff. Their financial position was not very satisfactory, and out of 240 members residing at Cairo, only forty had paid their subscription.

Signor ROSSI read a paper on the Civilisatory Mission of Egypt with respect to Central Africa. Egypt, thanks to the efforts of Mehemet Ali and the present Khedive, could take its place now amongst the civilised countries.

Major Mokhtar Efendi, one of the officers attached to Rauf Pasha's Expedition, read a paper on Harar and the Somali Coast. The Somali tribes subject to Egypt he estimates at 130,000 souls, the Isas being the most powerful amongst them. They are nomads, and are supported almost exclusively by breeding camels. Harar stands on a hill, commanded by Mount el Hakem, bounded on the south-west by the hills of Galla Garse, and on the north-west by Shoa. Its territory is 186 square miles in extent. The town is surrounded by a wall with twenty-four crenellated towers. It lies at an elevation of 5582 feet above the sea, and its climate is healthy. The rainy season begins on the 15th March and lasts for six months, the rainfall being most considerable during June. The inhabitants are Mussulmans, of gentle manners, but avaricious. Education is carefully attended to. There are public schools for the children, and adults attend classes held by the Kadi. Women are respected, and though bigamy is permitted by law, it is but rarely practised, and divorce is hardly ever resorted to. Durra is the principal article of food. Wheat, maize, lentils, beans, cotton, aniseed, barley, and sesamum are cultivated, but coffee is the principal crop, and is said to be superior to that of Mokha. The sugar-cane, pomegranates, grapes, oranges, lemons, and tobacco are likewise grown. Much progress has been made in industry, particularly in the manufacture of arms, in weaving and bookbinding.

M. DE LESSEPS gave an acconnt of the great engineering works completed in the course of the nineteenth century, and expressed a hope that before its close the Panama Canal, the great Asiatic railway, and the creation of an inland lake to the south of Algeria would be accomplished.

NOTICE.

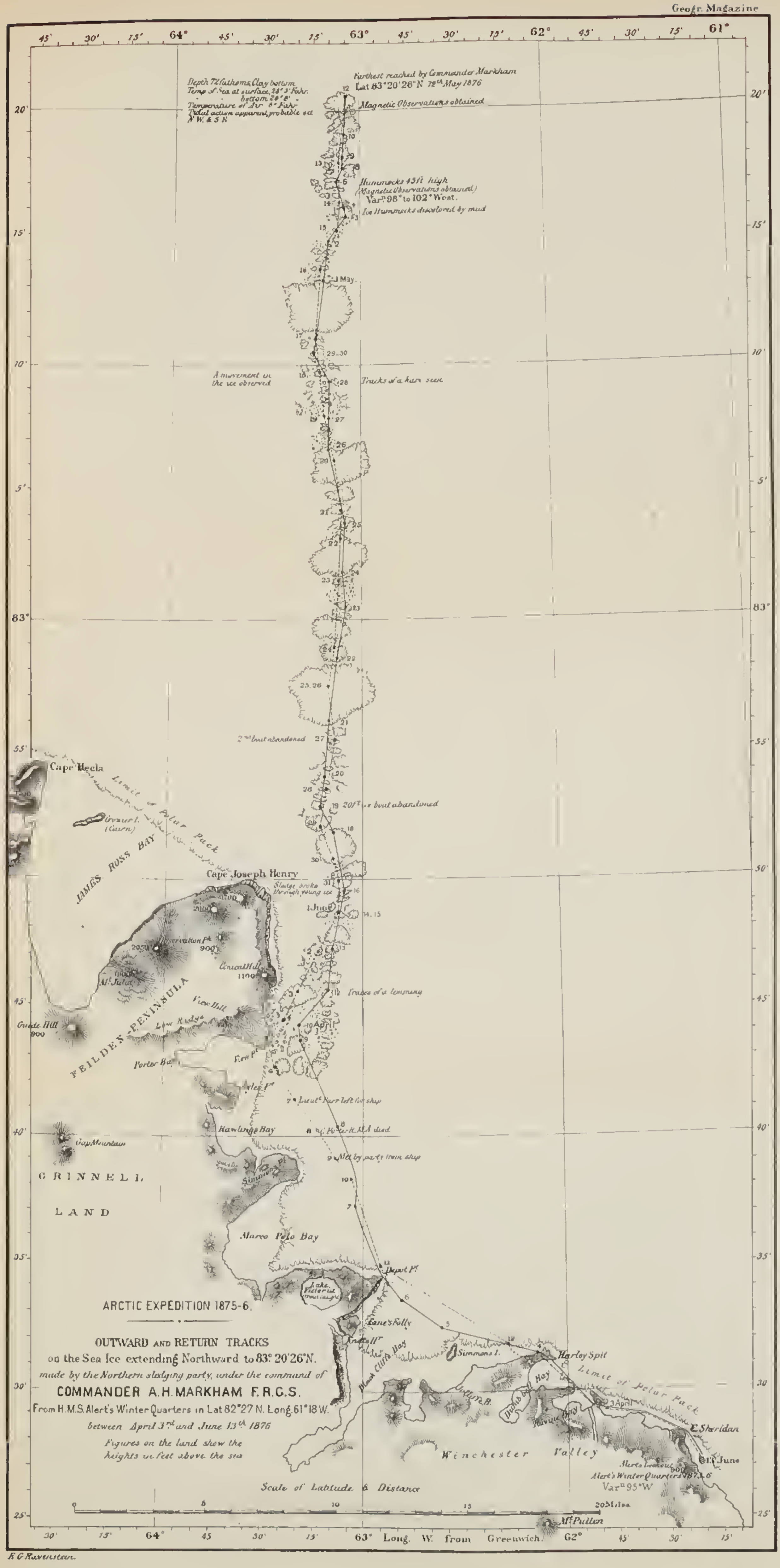
The Office of THE GEOGRAPHICAL MAGAZINE *is at* 57 *&* 59, *Ludgate Hill, E.C.*

Manuscripts sent to the Editor cannot be returned, nor can the Editor be responsible for them.

Letters and Articles intended for insertion should be written on one side of the paper only, and must be accompanied by the name and address of the writer; not for publication, but as a mark of good faith.

The right of translation is reserved.

Annual Subscription and Postage, £1, *Inland. Foreign Orders must be accompanied by P.O.O. or Cheques to include the full amount of Foreign Postage. Post Office Orders to be made payable to Messrs. Trübner & Co.,* 57 *&* 59, *Ludgate Hill, London, E.C.*



ARCTIC EXPEDITION 1875-6.

OUTWARD AND RETURN TRACKS
on the Sea Ice extending Northward to 83° 20′26″N.
made by the Northern sledging party, under the command of
COMMANDER A.H. MARKHAM F.R.G.S.
From H.M.S. Alert's Winter Quarters in Lat 82°27 N. Long. 61° 18 W.
between April 3rd and June 13th 1876
Figures on the land show the heights in feet above the sea

E.G. Ravenstein.

THE

GEOGRAPHICAL MAGAZINE.

APRIL, 1877.

THE ARCTIC SLEDGING JOURNALS.

[An unavoidable injury has been done to the Arctic Expedition by the long delay in making the journals of the extended sledging parties accessible. Their perusal will give some idea of the hardships and sufferings that were cheerfully encountered in order to secure success. We have pleasure in publishing the following review of the sledging journals by an old and distinguished Arctic officer of great sledging experience, who served in two expeditions and passed three winters in the ice. The testimony of such an authority as to the exceptional difficulties encountered in 1876, and as to the splendid work of officers and men during the late expedition, far more than counterbalances all the shameful attempts at detraction which have disgraced the columns of a portion of the English press. Detraction (with one notorious exception) comes from ignorant stayers at home—generous and hearty appreciation comes from men who have done similar work and who know what it is.]

On the return of the late Arctic Expedition, in common with most old Arctics, I was very much surprised at the unprecedented attack of scurvy, from which very few indeed of the crew appear to have escaped scatheless, and which, by shortening the sledge journeys, has diminished the geographical results we should otherwise have obtained. It is not my intention to discuss the question of lime-juice for the sledge parties, beyond observing it was not previously customary to carry it; and as none of the earlier parties broke down, I cannot conceive it possible that men who left the ship in sound health would be completely prostrated in twelve days, as happened with some of Commander Markham's party—in sixteen days with one of Lieut. Beaumont's—owing to the want of lime-juice, and all three extended parties brought to the verge of destruction in two months. In point of fact, scurvy in sledge journeys was never anticipated, as is shown by the absence of any mention of it or its premonitory symptoms in the directions drawn up for the use of officers commanding sledge parties, by the able medical officers of previous expeditions, amongst them being the present Medical Director-General of the Navy.

Nor do the officers of the late expedition, who had carefully studied the journals of their predecessors, appear to have anticipated it—Commander Markham remarking, May 2nd (30 days out), "the invalids are not improving, and we are inclined to believe they are ll attacked with scurvy, although we have not been ed to suppose that there is any probability of our being so afflicted, and are ignorant of the symptoms." Lieutenant Beaumont, May 7th, suspects a state of scurvy, and remarks: "I had no reason to expect it—indeed, I never thought of it." The health of Lieut. Aldrich's party remained good till April 30th, when, with the exception of two, they rapidly became scurvy-stricken, although they did not consider it so till on their return journey.

In regard to the extended parties of earlier expeditions, I find Lieutenant Osborn observes of himself, May 28th (1853): "I have been unwell all day, and I am still weak and feverish, occasioned by the state of my right leg, which now shows symptoms of erysipelas or scurvy, which of the two I am not doctor enough to tell." And even as late as June 19th, when Simon Dix was evidently (from my present knowledge) suffering from scurvy, Osborn does not mention the word, but on the 26th September, in a letter to Sir E. Belcher, he says: "About this time (June 18th) a disease, which assumed, as far as I can judge, the appearance of scurvy, showed in my party, Simon Dix and myself being the sufferers." He had then probably obtained a medical opinion.

Captain Kellett reports to Sir E. Belcher, February 10th, 1854: "Lieutenant Mechan arrived July 6th (1853), having been absent ninety-four days, his party all well, with the exception of one man, who has lost, I fear, the sight of one eye. Commander McClintock returned July 18th, after an absence of 105 days; he walked in with his crew all safe and well." The thaw had compelled the abandonment of sledge on the north shore of Melville Island, 40′ from the ship.

These facts will, I think, prove that the officers of the late expedition had no reason to anticipate scurvy on the sledge journeys, judging from past experience.

The short distance made by the recent sledge parties, in comparison with their predecessors, also surprised me very much, when I had only Captain Nares' report and the chart showing the sledge journeys to judge by, and I confess to thinking *we* should have done better. No unbiassed person, however, can read the modest matter-of-fact journals of the three officers commanding the extended sledging parties and retain that opinion. Nothing as yet published gives an idea of the tremendous obstacles Commander Markham and Lieutenant Beaumont experienced from hummocks of ice, of all sizes, up to 40 and 50 feet in height; soft snow up to the waist, or, worse still, half-thawed, with a frozen upper crust, which would partly bear the weight of the body, and then down you would go with a jerk thigh deep. No sledge parties of which I have any knowledge ever encountered such difficulties. Lieutenant Aldrich's great obstacle was from soft snow, in other respects he appeared to have experienced much the same travelling as Kellett's parties. When it is considered, in addition, nearly all the crew were scurvy-stricken, and half had to be dragged on the sledges by their fellow-sufferers, little better than themselves, and not knowing how soon they would collapse, we may thank God for the preservation of these parties, who were all literally on the verge of destruction; as it is, we have to mourn the loss of three poor fellows who died on the journey. Extracts from the journals will speak more eloquently than any words of mine.

Commander Markham left the 'Alert' on April 3rd, 1876, after filling up with provisions from the depôt at Cape Joseph Henry; he was to push out due north into the Polar pack, and attain as high a northern latitude as he could effect. As it was uncertain when the ice on the offing would break up, this party dragged two boats in addition to their equipment and provisions—hence the two sledge parties had three sledges to drag. The two smaller sledges were first taken on, the whole party then returned and drew on the larger sledge; so that for every mile made good, where travelling was fair, the men had to drag the sledges two miles, and one mile was walked, and in soft snow and among hummocks it was as bad as dragging, the support afforded by the belt being lost. As the men broke down and were unable to drag, or compelled to be carried, it was necessary to make three, four, or five journeys, the loaded sledges being drawn three, four, or five miles, and the unloaded two, three, or four miles to make good one mile. In seventy-two days' absence they made good 168 statute miles, going over 600 miles to accomplish it. Judging from the journal, I consider the loaded sledges were actually dragged half the difference between made good and travelled in addition, or 168 + 216 = 384 miles, the other 216 being done by unloaded sledges returning for another load or by walking back to drag on a loaded sledge.

The nature of the obstacles is best given in Commander Markham's words:—April 11th, "The floes are small but very heavy; they appear to have had a terrible conflict with one another, the result being what we are now encountering, viz., a great expanse of hummocks varying in height from 20 feet to small, round, nobbly pieces, over which we stagger and fall. Between these hummocks the snow-drifts are very deep, and we are continually floundering up to our waists, but the men struggle bravely on." Again, April 15th, "These hummocks consist of large fragments of ice, squeezed up into every indescribable shape and form, varying from 15 to 25 feet in height; so thickly compacted together are these huge masses of ice that they appear to form an impenetrable barrier to our advance, but by dint of energy and perseverance our road-makers soon succeeded in overcoming them. Some of the floes are far thicker than others, and it is of no unfrequent occurrence that we have to lower the sledges a distance of 6 or 7 feet from the top of one to the surface of another, and *vice versâ*." This sort of work continued throughout the journey, varied by Palæocrystic floe, of which he remarks: "We seem to have got quite away from smooth, level floes, surrounded by dense hummocks, and have reached floes of gigantic thickness, with most uneven surface and covered with deep snow." On the 19th, having only advanced 300 yards in 3½ hours, the 20-feet ice-boat is abandoned; "at 7 P.M. we arrived on some young ice between the floes, on which we rattled gaily along, accomplishing half a mile in something like two hours, good work for us;" but only a mile was made good in the day, for 8 marched.

I do not remember in 114 days travelling with men, and 50 days with dogs, during my Arctic career, doing less than 3 miles a day, more than four or five times. The Commander is grateful for small mercies. Suppose two columns of railway trains charge one another, and the interstices of the *débris* filled with soft snow, over which the sledge has to be dragged, and the uninitiated may get some faint idea of the nature of the work. Lieutenant Parr and a party generally commenced the day's work by forming a practicable road for the sledges to follow. Commander remarks, "Parr working like a horse . . . . a slave . . . . a labourer."

This work is continued for forty days; and to add to their labours, the first case, of what we now know to be scurvy, occurred on the eleventh day out, and another next day, both too ill to walk, and had to be dragged on the sledge, adding materially to the weight, while diminishing the motive power 12 per cent. As a rule, they were carried for the remaining sixty days of the journey. By the 3rd May, they had five invalids "utterly helpless and therefore useless." 4th, "More of the men are complaining of stiffness and pain in the legs, which we fear are only premonitory symptoms" (*i e.*, of scurvy). On the 7th, five men were on the sledges. On the 9th, the Commander reluctantly comes to the conclusion that aggravated scurvy is the complaint, describing his party as follows:—"Porter worse, complains of pain in the chest, mustard plaster applied; he has to be revived occasionally with spirits of ammonia. Hawkins' face breaking out with boils and sores, and his gums are affected. Shirley suffers from faintings. . . . . Indeed, this is a general complaint with all the sick . . . . who have even to be carried from the tent to sledge and back again." The duty of attending the sufferers is harassing to both officers and men, although willingly and cheerfully performed. Four other men were also complaining.

May 11th, they pitch their most northern camp. "Two of the invalids feeling strong" attempt to walk; one faints altogether, the other almost does so. They sounded in 72 fathoms, bringing up specimens from the bottom, the temperature of the surface water being 28°·5 Fahr. to 30 fathoms down, then 28°·8 to the bottom. Next day the invalids are left in the tent, the officers and remainder of party start after breakfast to walk north. After "struggling up to their waists in soft snow" for three hours, although unencumbered, they only got 1½′ from their encampment. The flags and banners are displayed in the highest latitude as yet attained by man, 83° 20′ 26″ N., or half-a-mile less than 400′ from the Pole. "Three cheers were given, and one more for Captain Nares; then the whole party, in the exuberance of their *spirits!!* sang the 'Union Jack of Old England' (never was its honour more worthily upheld), 'the grand Palæocrystic sledging-chorus,' winding up with 'God save the the Queen.'"

Returning to the sledge, a magnum of whiskey, presented by the Dean of Dundee, to be drank in the most northern latitude, was partaken of by the party. A hare, shot by Moss, and kept for the occasion, gave them a sumptuous supper. The evening was wound up by songs, in which even the invalids joined. "All seemed cheerful, happy, and contented" is the most northern remark made in the journal.

The return journey commenced May 13th, following their outward track, the work being much the same, aggravated by men getting weaker and losing appetite. May 16th, "At breakfast, in one tent, scarcely a pannikin of pemmican was eaten" by eight men, the allowance being a pannikin apiece; and I find in my own journal, after fifty days' absence, remarking on its insufficiency, and for the first three weeks they were "ravenous, and could have eaten an extra pannikin at supper." They also suffered from thirst, which may appear curious, surrounded as they were by ice and snow, but fuel could not be spared to melt it, and eating it only aggravates thirst. On the 17th they abandoned the other boat, trusting there may have been no disruption of the ice, their only hope being to get into the land as quickly as possible. The invalids getting weaker and unable to dress or undress themselves, fainting at times. Snow, soft, and deep. Hummocks very high; one measured by aneroid was over 50 feet high. The whole party were in fact getting weaker. On the 25th, "Out of thirty-four legs in the whole party only eleven are sound, even some of these are shaky." On the 28th only the two officers are intact, and judging from their small appetites, I should doubt even that. May 31st, "We are a perfect band of cripples." June 2nd, "Five men are carried, four can just hobble along, the remaining six men being very shaky. . . . . It is absolutely painful to witness the poor fellows hobbling along, yet doing their utmost to be cheerful," and this with "snow in places up to our waists, and very wet between hummocks, our foot gear being literally soaking" from sludge and ice-cold water. June 4th, reached the depôt at Cape Joseph Henry, finding Captain Nares and a party had only left it the preceding day. Three hares, however, had been left for them, on which they fared sumptuously, and with news and letters cheered them up a little. On the 6th June, the "only chance of saving life is by receiving succour as soon as possible. Although the distance from the ship is nearly 40 miles, over floes covered with deep snow, and girt by heavy hummocks, Parr has nobly volunteered to attempt it, and has confidence in being able to accomplish it." He started 8 P.M. 7th, and arrived on board next evening about the same time (quite done up and hardly able to speak). Every available man and officer under the Captain immediately proceeded to the rescue, preceded by Dr. Moss, Lieutenant May, and the dog-sledge, who met the sufferers 11 P.M. of the 9th—alas! too late to save the life of G. Porter, R.M., who had died noon 8th from exhaustion brought on by his long sufferings. I need scarcely say the invalids cheered up with the arrival of succour, and they arrived on board the 'Alert' 1·30 A.M. June 14th. Of the original party of fifteen men, only three could drag the sledge alongside, the remainder being carried on the relief sledges. They were seventy-four days absent, making good 73 miles on the outward journey and 71 homeward, or 144 miles made good for 608 statute miles marched = 8·4 miles a day, and although the sledges only made good on an average 2 or 2·3 miles, they were actually dragged, as near as I can calculate, about 5 to 5·4 miles a day.

The western party of two sledges, under Lieutenants Aldrich and Giffard, left the ship on April 3rd, keeping company with the Polar party till both left Cape Joseph Henry. The great difficulty they experienced was from soft snow, in which "the sledge sinks until brought up by the sledge-bottom, which presses hard on the soft surface of the snow," compelling resort to double banking and half-loads; in twenty-eight journeys during the month of April only two were exceptions, the first and last.

April 25th, Lieutenant Giffard parts company, leaving them now alone; up to this time, with the exception of the first few days, the crew had been in good health. On that day, although Lieutenant Giffard's crew assists in dragging their sledge for 6½ hours, owing to "deep, soft snow," the sledge frequently came to a stop, and the distance made good was only 3½ miles, and would of course have been only half that distance with the single crew. Further on is the observation, "The double journeys are most discouraging to the men, and their looks of disappointment, when, after nine hours' labour, they find themselves only 2½ to 3 miles from where they started, show how much they would do if they could." The measured rate of advance was 1400 yards an hour, which, "when divided by three for bringing up the second load, gives our actual progress at about a quarter-of-a-mile an hour." Crossed 83rd parallel April 28th. On the 30th, the Serjeant's leg looks very ugly, and although "appetites are good, the full allowance is not eaten except by a few of us," showing to me scurvy was commencing its insidious attacks. May 2nd, having left a depôt, start with 30 days' provisions, travelling and making good 9⅔ miles. 5th, "Serjeant's leg not improving," or men's appetites. The soft, deep snow through which we advanced by standing pulls, or very few yards without one, was crusted over in such a manner as just not to bear you, but let you in suddenly up to your knees, and rendered the extrication of your feet somewhat difficult unless pulled out exactly as they had broken through," just as Beaumont describes his work. On 7th, "Health good, except stiff legs"—two of the men's legs "swollen and puffy looking." On 10th, Stiff and puffy legs defy all medical skill, unable to bandage, as "slightest pressure of the finger leaves a dent, which remains a considerable time;" and although strictest orders are given against "tight lacing" . . . . "I find the loosest moccasin-string cuts an ugly red-looking mark." It seems curious that it was not then considered scurvy. Lieutenants Aldrich and Ayles being the only two who eat all their pemmican, the others gradually going down hill, and becoming dispirited, "lamenting the wretched state of legs, and fearing their work will not bear comparison with the other sledges, *and those who have gone before us*," and the latter fear appears to be common to all the parties.

On the 16th, Aldrich and Ayles have to walk back for the pickaxe left at the last encampment; on their return nearly losing themselves, a gale of wind having sprung up, and a heavy snow-drift obliterating the sledge tracks, but fortunately found the tent after fourteen hours' absence, glad to get tea and pemmican, "fully appreciating the comforts of our Arctic tent," instead of camping on the floe for the night. On the

18th their extreme was reached, latitude 82° 16′ N., longitude 85° 33′ W., furthest land seen being in 86° 30′ W. longitude. May 21st, temperature in tent 57°, "horribly warm" is a note to the information. 22nd, visited by a snow-bunting. The Mayor and Corporation of Portsmouth were toasted, "the men remembering with many queer and pointed remarks the very satisfactory manner they were entertained this day last year. Mitchell and Ayles are the only two sound men left." As with the other parties, Her Majesty's birthday was not forgotten.

In consequence of the scurvy they were unable to make as long marches as on the outward journey, and have to go on short allowance till the depôt was reached, June 7th, when "they revelled in biscuit and luxury;" the latter, as I glean from the journal, being sugar and potato (preserved), and cocoa. The medical inspection, June 3rd, was—two men unable to drag at the sledge; one, very bad leg; three, bad legs and other complaints. "Ayles perfectly sound." Doidge asked, "Is scurvy ever got while sledging"? Although he was answered "No," from this date the men, however, knew what was the matter. The work of dragging now fell almost entirely on Ayles and his officer, fainting occasionally being an additional trouble. On the 12th, another depôt is reached with lime-juice in it, probably sent from the ship. On the 19th, the Serjeant was put on the sledge. They came to View Point at 7 A.M. of the 20th, and as it was evident they could not reach the ship without assistance, Ayles, like Parr with the Commander's party, volunteered to walk in to procure it. "There's a silvery lining to every cloud," "and never did one appear so welcome as that which came in the form of a shout from the hill above View Point and the discharge of a gun," which came from Lieutenant May, who had been sent to their aid by Captain Nares on the return of the Commander's party. The luxuries this time were ox cheek, apple jelly, oyster and egg flip, on which the party regaled much to their satisfaction. "Two men fainted on the 22nd, and Doidge had to be put on the sledge; even Ayles showed his first sign of weakness of limb." They reached the ship just after midnight on the 25th June, having been assisted by a party from the ship. "Ayles and Mitchell" were the only two men of the party "in the drag ropes, the latter allowed to totter alongside in the belt, assisted by the Commander, in consideration of his own request," game to the last.

This party was eighty-four days absent, having made good 455 miles, but marched 635 miles—the sledges, I calculate, having been dragged 545. The daily average in statute miles being made good, 6·3; marched, 8·8; sledge drawn, 7·45.

Lieutenant Beaumont left the 'Discovery' on April 6th, and reached the 'Alert' at 10 A.M. on the 16th, from whence he made his final start on the 20th to cross Robeson Channel and explore the North Coast of Greenland. The journey up from the 'Discovery' was very good preliminary training for his crews, as their loads were light, 150 lbs. a man. He, therefore, commenced his journey under much more favourable circumstances than the other two parties, being exposed to a brief period of extreme cold in comparison, besides the preliminary training. The work was heavy crossing the channel, but not as hard as that experienced by the Polar party, as he travelled about 6 miles a journey, making good 4½.

By 11.30 p.m., 27th, they reached the shore of North Greenland, J. J. Hand, A.B., being the first to plant the Union-Jack on it. Poor fellow, he was also the first attacked by scurvy, and the first of the sledge parties who died from it and the work. The heavy hummocks made by the pressure of the Polar pack against the shore, varying from 10 to 40 or 50 ft. in height, required the pickaxes to be kept constantly going to form a road, or the gaps had to be bridged over, and when this became impossible they had to take to the steep snow-slopes on the land. Beaumont remarks: "Very slow work and trying to the temper, for it was difficult to stand, much more drag the sledges; they slid down more than we could drag them along, so that every now and then it was necessary to have standing pulls up the hill, to prevent them going over the edge of the slope." As may well be imagined, when some of the slopes were ascertained by Dr. Coppinger to vary from 20° to 24° by clinometer, "hard and slippery."

On the 3rd May the distance travelled was, I see, 5½ miles, but only half-a-mile was made good—decidedly "slow and trying to the temper"—after four hours' marching and six road-making. On the 4th Dr. Coppinger leaves them. On the 6th, Hand complains of stiff and sore legs, and next day, Sunday, Beaumont considers, after examination, it is scurvy, in which he is confirmed the day after by the captain of his sledge, an old whaler. On the 8th "no one cared for their pemmican after an idle day yesterday:" as an old sledge traveller, I should say a bad symptom; in my experience we eat more when detained from bad weather or other cause, *pour passer le temps.* May 11th, 2 A.M., Lieutenant Rawson is sent back with Hand, "who can scarcely get along in the soft snow." The loss of his second in command was severely felt by Beaumont, as well as the weakening of the party by one-half; but events proved its necessity, as Rawson did not reach Polaris Bay till June 3rd. Hand, who had been carried on the sledge since May 19th, died six hours after their arrival. Bryant had been unable to drag since May 23rd from scurvy, and Regan, A.B., was found by Dr. Coppinger to be suffering also from scurvy.

After Rawson left, the travelling appears to have been good for a few days, as they made 10½ statute miles on the 12th, and 8¾ on the 13th. On the 16th, being "Craig's birthday, we celebrated it by giving him an extra allowance of tea." Shades of Benbow, a sailor drinking tea on his birthday! The schoolmaster must certainly be abroad. The snow now became very deep, varying from "2½ to 4 feet deep, and was no longer crisp and dry, but of the consistency of moist sugar. Walking was most exhausting; you literally had to climb out of the holes made by each foot in succession—the hard crust on the top, which would only just not bear you, as well as the depth of snow, preventing you pushing forward through it, each leg sunk about three inches above the knee, and the effort of lifting them so high soon began to tell on the men." May 18th, "Our next march was made under a hot sun, through snow never less than 3 feet thick; we were parched with thirst, and obliged to halt every 50 yards for breath."

As the shore appeared 2 miles off, Beaumont went ahead to look for better travelling, with what success his remarks will best show. "I got about 1½ mile ahead of the sledge in three hours. I was nearly done, so I hailed them to go to lunch, but would rather have missed three meals than have gone back all that distance, so I had a good rest and made a sketch instead, and then, seeing that the sledge would never reach me that day, I started back for them, walking in my track. In the meantime, the men had been struggling on as best they could, sometimes dragging the sledge on their hands and knees to relieve their aching legs, or hauling her ahead with a long rope and standing pulls." When halted for lunch another day, "two men crawled on hands and knees for 200 yards, rather than walk unnecessarily through this dreadful snow . . . . but although tired, stiff, and sore, there is not a word of complaint—they are cheerful, hopeful, and determined." Only a mile was made that day. As the land appeared only a mile off —as it had done for the two previous days—after an hour's work with sledge, and making no progress, at 8 p.m. they started for it in two ranks, three abreast. At 1 a.m. it appeared no nearer, so, sending all back but Gray, he and Beaumont, after two and a-half hours' more walking, reached the land near Mount Farragutt. They returned in two and a-half hours to the sledge, arriving at 8.45 a.m., "showing the difference between making a road and walking in an old one." Resting and bad weather detained them till 7 p.m. 22nd, when the homeward route commenced—"every one in low spirits at our disappointment," two men unable to drag, and three others suffering from scorbutic symptoms. On the 26th, the two former are unable to "put on their own footgear," and Paul is unable to drag. On June 3rd, they have to carry him on the sledge. The sledge-fare is also distasteful to the poor sick men, and slow as is the progress of the sledge—1½ mile a day—they have to wait for some of the invalids. June 7th, "Jenkins felt unable to go a step further; made room for him on the sledge."

From this time, as there are but three to drag, only two being sound, half-loads have to be taken on, the two men carried being quite helpless. June 11th, "We had some preserved meat for supper that had been left for the dogs, but which the sick enjoyed most thoroughly." On the 11th they started, intending to cross the channel for the 'Alert,' being uncertain as to the road to Polaris Bay, or whether they should find any one there or not; but before they were a mile from the shore they "came to open water, a long patch 30 or 40 feet broad, with ice around very rotten;" there were also patches of open water, which, with a broken-down crew and no boat, precluded any idea of crossing, so, reluctantly returning to the shore, completed provisions from the depôt and started for Polaris Bay 42 miles off. On the 12th, leaving three sick men in the tent, commenced advancing by half-loads. In less than an hour, "Dobbin was obliged to stop . . . . whilst Jones said he had never been so bad before. . . . . If these two men went down, there would only be Gray and myself to take the five on to Polaris Bay, 42 miles off;" therefore, leaving them to find the way back, Beaumont and Gray took the sledge back to the depôt, and completed to eighteen days' provisions. Jones almost broken down; Beaumont and Gray themselves feeling stiff and sore, with premonitory scorbutic symptoms, had now to drag on the provisions and two sick men, the others hobbling along very slowly, marching between 2 and 8 miles a day, but only making good from 1½ to 2 miles; one day I see 8 miles marched and none made good, next day they did 4 miles; this was in soft snow, more than half-thawed, wetting them through to the thighs, or wading through ice-cold water; and only those who have experienced it can know how painful it is to have a constant stream of it pouring down on the foot, over the boot-top, for hours every day, or how hard men, who have once experienced it, will work to get back before the thaw commences—it is more dreaded and worse than extreme cold while on the march. In one ravine the sick had to be lowered down, lashed up in a sail; and so the weary time passed till 2 A.M., June 25th,, when they were providentially met by Lieutenant Rawson, Dr. Coppinger, Hans the Eskimo, and 8 dogs; they were then 21 miles from Polaris Bay. The lime-juice and preserved meat, I need scarcely say, did much towards reviving the sick, also the certainty of now being near the end of the dreary journey. The two worst cases were taken to Polaris Bay by Dr. Coppinger on the 28th, which he reached next morning, but too late to save the life of Charles Paul, A.B., who died at 5 P.M. of the 29th, and was buried beside J. Hand, A.B., who, as already stated, had died June 3rd."

The remainder of the party arrived at Polaris Bay at 7 A.M., July 1st, where seal meat, geese, musk ox, rest, and the arrival of Captain Stephenson, July 19th, with boots and medical comforts, such as vegetables and port wine, restored the scurvy-stricken party, as Dr. Coppinger reported all of them to be on his meeting them. Beaumont, with some of the party, did not rejoin the 'Discovery' till August 15th, having had an unpleasant time crossing Robeson Channel in a boat, with a drifting pack—child's play, however, to what they had gone through. This party was 132 days absent from their ship, ninety-two days travelling, the remainder in Polaris Bay. Eighty-one marches were made, distance travelled was 508 statute miles; the longest march was 10·5 miles. It is difficult to calculate the distance travelled by the sledge. The distance accomplished does not, however, give the faintest idea of the labour expended, as least distance means really hardest work.

Did space permit, double or treble the number of similar extracts from these modest and unassuming journals could be given, in which the Commanders, while making no mention of themselves, give the highest praise to the officers and men under them for their energy, zeal, and perseverance in striving against obstacles no previous sledges ever experienced for so prolonged a period, and for their patience and cheerfulness when prostrated by scurvy, or for the assistance given to the sick and helpless. Lieutenant Beaumont made special mention of Frank Jones (stoker), who "earned the gratitude of the whole party by the cheerful manner in which he carried out the numerous duties which devolved upon him. Even after he himself fell sick, his patient kindness to all was beyond praise," and not the least of the troubles of the sick, "while suffering agonies," was the thought they were a burden to their fellows, and that their work had fallen short of their predecessors. Their deeds speak for themselves far more eloquently than words of mine can do; the only comment I have to make is, that though they did not command success, none have ever better deserved it.

We have pleasure in adding the following letter from an old Arctic seaman to the above review of the sledge journals. The writer was a petty officer who served in three Arctic Expeditions consecutively, and was captain of a sledge during the spring travelling. He, like the officer under whom he served, was misled by appearances, and at first thought that the old hands would have done better; but a perusal of the sledge journals of the officers of 1876 has altered his opinion on that point:—

"I this day return to you the journal and reports you were so kind as to send me. A thousand thanks for having allowed me the glorious privilege of perusing them. I have carefully read them, and pondered over every line with the deepest interest. One cannot read such painful narratives without allowing one's mind to be disarmed of all hostile criticism, and why the Expedition so soon returned is no longer a mystery to me. The formidable obstacles the parties had to contend with, and the almost superhuman exertions made to surmount them, are, I believe, without a parallel in the history of discovery. Really, had it not been for the indomitable courage, energy, and perseverance of the officers, I question whether the whole affair would not have come to a fearful issue. There is to me one noticeable fact in the case. They had not made more than two or three journeys from the ship, when the officers wrote in their journals that the men were complaining of being tired, a proof that all was not sound within. Everything, in my opinion, goes to prove that travelling had nothing to do with originating the scurvy, and all the lime-juice in the world would not have altered the case."

THE PRESIDENT OF THE AMERICAN GEOGRAPHICAL SOCIETY
ON THE
ENGLISH ARCTIC EXPEDITION.

Chief Justice Daly, the President of the American Geographical Society, has written a very able and, in the highest sense, judicial article on the English Arctic Expedition, in the *North American Review* for March-April 1877. We recently called attention to an excellent article on the same subject in the *Quarterly Review*, and the two may be received as the true voices of England and America.

The admirable work and striking success of the Expedition has been recognised with pride throughout Great Britain and Ireland, and that recognition has been expressed on many opportunities and in many ways. The vast gathering at the meeting of the Royal Geographical Society, at St. James's Hall, on December 12th, was one enthusiastic expression of this feeling out of many. Probably the most emphatic and decisive demonstration, and no doubt that which was most satisfactory to the members of the Expedition themselves, was the dinner given to them by the whole body of old Arctic officers. But every true Englishman who has read the carping criticisms, the attempts to damn with faint praise, and the actual misrepresentations which have disgraced the columns of a portion of the English press, since the return of the Expedition, must have done so with feelings of shame and disgust. Much has been said of the physical scurvy from which our gallant explorers suffered, which, however, only brought out their fine qualities with more prominence. Better that than the moral scurvy, showing itself in pitiful attempts at detraction, which afflicts the writers to whom we have had to refer. Well may Chief Justice Daly, an impartial Judge in every sense, pronounce their attacks to be alike ignorant and unjust.

Those who are conversant with Arctic literature, know well that other Expeditions, including those of Parry himself, were exposed to similar attacks; and, so long as the great heart of the nation is sound, scum of this description is as harmless as it is ephemeral. The worst feature in the present exhibition of spite is that the very sufferings of our brave Arctic heroes have been turned into a pretext for throwing dirt at their commander.

We gladly turn from this discreditable rubbish to the generous and appreciative pages of our American contemporary. Chief Justice Daly recounts the difficulties and dangers of the voyage up Smith Sound, the autumn travelling, the proceedings in winter quarters, and the heroic efforts of the sledge-travellers during the spring; and he enumerates the rich harvest of scientific results obtained by the Expedition. The learned American expresses the opinion that "by the geographer and man of science the voyage will be pronounced a most important and successful one." He then administers a well-deserved rebuke to the yelping pack of fault-finders in this country. "Much of this fault-finding," he observes, "so far as it has fallen under our observation, has been by writers whose productions show that they have but a very limited acquaintance with what is known respecting the Arctic. A leading English journal, the *Saturday Review*, went so far as to declare that the principal officers in command had no heart in the work; that they went because they were appointed, and returned as speedily as they could. To us, on this side of the Atlantic, this appears to be exceedingly unjust. Judging only from what is known to the world, but little if anything more could have been accomplished by remaining another year with crews disabled by scurvy. The wise and true course was to return at the first available opportunity. Sir George Nares's decision in this respect has been approved by the Admiralty, and will be approved by all who are familiar with the history of Arctic exploration."

Chief Justice Daly then gives a *résumé* of the contents of the very able paper read by Sir George Nares at the great meeting of the Royal Geographical Society, on the 12th of December, and enters upon an interesting and almost exhaustive discussion of the arguments respecting the theory of an open Polar Sea. He closes a most valuable paper by an admirable defence of Arctic exploration. "There is no portion of the earth's surface where exploration for scientific purposes is of so much value as in the Arctic regions. There is scarcely a problem relating to the physics of the globe which can be fully understood without a knowledge of the phenomena within the Polar regions. Whatever phenomena we may wish to investigate, it is of special importance to determine its maximum and minimum values, and in nearly all questions of terrestrial physics, one or other of these values is found in the neighbourhood of the Pole. If, for example, we wish to determine the extremes of temperature, one is to be found near the Equator and the other near the Poles. If we wish to investigate the system of circulation of the winds, our investigation would be sadly deficient without a knowledge of the phenomena of the Polar regions. If we wish to investigate the currents of the ocean, we find indications of currents coming from the Polar regions, and it is important to be able to trace these currents to their source. If we wish to investigate the laws of tides, we need observations from every ocean; and observations in the Arctic regions have a special value, on account of their distance from the place where the daily tidal wave takes its origin. If we wish to study the phenomena of atmospheric electricity, no part of the world is more important than the Polar regions." And so as regards the phenomena of terrestrial magnetism, the dimensions and figure of the earth, and the variations in the force of gravity. "In short, there is no problem connected with the physics of the globe which does not demand observations from the Polar regions, and generally the Poles and the Equator are more important as stations of observation than any other portion of the earth's surface. If the information which has been acquired on these various subjects in the numerous Polar expeditions of the last half-century were annihilated, it would leave an immense chasm."

THE MORAL SCURVY.

I.

The virulent attacks upon Captain Nares, and his conduct of the Arctic Expedition, by a portion of the press, which is afflicted with a sort of moral scurvy, have hitherto been treated by us with silent contempt. We are old enough to remember similar attacks on other distinguished officers and on other successful enterprises, and we know that they have no lasting influence. No one remembers the names of the men who reviled Parry, or Ross, or Austin, or what they said. All we know about them is that the breed is not yet extinct. The malice of the revilers and detractors of to-day will be forgotten to-morrow. The work of Nares's Expedition will be valued, and the heroic endurance of his officers and men will be spoken of with pride and admiration as long as England exists.

We believe, however, that constantly repeated assertions, however false, if uncontradicted, are calculated to be mischievous, although that mischief can only be temporary. We have, therefore, decided upon answering every attack, and exposing every erroneous statement that is published, and which comes to our knowledge, having reference to the work of the Arctic Expedition. In many cases the detailed information contained in our former articles will refute the assertions which we shall have to denounce; and it will be sufficient to supply our readers with a reference to the particular passages. Occasionally, however, a fuller exposure will be needed.

The *Saturday Review* is, we regret to see, a foremost offender. That paper has already received a well-deserved rebuke from the distinguished author of the article in the *North American Review*, for its ignorance and injustice in writing of Arctic matters. It nevertheless returns to the subject, and makes several statements in its number of March 17th, 1877 (p. 315), which we now proceed to refute.

1. *Captain Nares made a hasty and dogmatic assertion that the North Pole was impracticable.* This shameful misrepresentation has been exposed over and over again. Captain Nares never made any such assertion. He said that the North Pole was impracticable by the Smith Sound route; that it was impossible to reach it, without depôts, over the frozen sea to the north of Grant Land, which was simply the statement of a well-ascertained physical fact, and was neither hasty nor dogmatic.

2. *The obstacles encountered were, with the exception of the scurvy, only just what were to be expected.* The readers of the sledging journals know how utterly untrue is this assertion. The obstacles were not and could not be expected, as they were unparalleled in the whole annals of Arctic exploration. The evidence of the distinguished Arctic officer who reviews the sledging journals, in the first article of our present number, is conclusive on this point.

3. *The time was wasted in dawdling and idle excursions.* This statement is unintelligible, and we can only suppose the writer must be scribbling at random. All the sledging parties were sent on defined and useful work, each one serving a purpose in the main objects of exploring, as far as possible, east, west, and north.

4. *Captain Nares chose to disregard his positive instructions, which were to make a sledging attempt to reach the Pole the main feature of the voyage, and not to make detailed surveys.* Captain Nares's instructions were not positive but discretionary; they indeed warned him that it had never been found practicable to make a very extensive sledging journey away from the land across a frozen sea. Captain Nares did make an attempt to reach the highest northern latitude possible the main feature of the voyage, and a most gallant attempt it was. He did not make detailed surveys.

5. *Captain Nares was sent out to stop three seasons, and hurried home at the end of the first.* The instructions to Captain Nares were not to stop out three, or even two winters if it could be avoided; but to come home after the first winter, if a reasonable amount of exploration had, in his judgment, been completed. An abundant amount of exploration was completed; at the same time, Captain Nares did not hurry home, but returned very reluctantly, in obedience to the dictates of an imperative duty, and to avoid serious loss of life.

6. *The scurvy was due to the omission of lime-juice from the rations of the sledge parties.* The fact that lime-juice was never taken as a ration by any sledge party in any previous Arctic Expedition which had no scurvy, is a proof that this was not the cause; but that the scurvy was due to exceptional causes in operation before the sledge parties started.

7. *Captain Nares had not sufficient reason for departing from the instructions in Dr. Armstrong's Memorandum.* Dr. Armstrong's Memorandum consists of hints and suggestions, which were in no sense instructions. Captain Nares very properly followed the precedents and advice of the most experienced Arctic travellers and medical men. Dr. Armstrong recommended that lime-juice should be taken in intense cold, without suggesting any means of using it. Though well knowing that this had never been done before by more experienced Arctic men than himself, whose practices Captain Nares would be sure to follow,

he only gave one line of bald advice, without explaining why former precedents were to be abandoned, and how his crude hint was to be carried into effect.

8. *Captain Nares invented a theory that frozen lime-juice could not be melted, when it appears that it can be melted by the easy plan of putting the bottle in the sleeping bag between the legs at night.* Captain Nares had no need to invent theories about the difficulty of thawing anything during intense cold, as he had had abundant practical experience while sledge-travelling in the previous expedition in which he served. The notion of melting lime-juice in the sleeping bags between the men's legs, at a temperature below zero (that of April while travelling), is too absurd to merit further notice. But it is important to observe that it was quite impracticable to use lime-juice as a ration, during April, in the form and in the receptacles in which it was supplied; that Dr. Armstrong knew, or ought to have known, that fact; that if he thought daily rations of lime-juice while sledging were indispensable, he was bound to have devised and suggested a means of using it; and that, in neglecting to do so, he, and he alone, is to be blamed for the outbreak.

So much for the misrepresentations of the *Saturday Review*. The next scurvy writer is one who, judging from the amount of acid in his compositions, has not found that specific to be a curative in his own case. The publication calling itself *Truth*, has an article containing the following statement, in its issue of March 15th, p. 343:—

Captain Nares, instead of sending lime-juice with his sledge, sent rum. If this is intended to mean anything, it means that Captain Nares excluded lime-juice from the sledge dietary, and substituted rum. The truth is that Captain Nares adopted exactly the same scale of diet as long experience had proved to be best, and as was used by the sledge travellers of former expeditions, except that he reduced the quantity of rum by one-half.

The rest of the article is mere vituperation unworthy of notice, and it concludes with the assertion that the Arctic Expedition was "a disgraceful failure," and that "efforts to hush the scandal up must be stoutly resisted;" in other words, there is to be a continuation of statements of the above character. By all means. They will be exposed as they appear, and will only bring shame on the concocters of them, if they are capable of feeling shame. There has been, and can be, no desire to hush up anything connected with the gallant enterprise which has been so nobly carried out, and which, while extending our geographical knowledge, has added so much to the prestige of the navy. Every incident connected with it, and every detail of its management, will long be carefully studied by all who are interested in Arctic exploration; while the perseverance, endurance, skill, and true British pluck of its sledge travellers will be dwelt upon with pride and admiration by successive generations of Englishmen.

We cannot conclude these remarks without referring, with pleasure and relief, to the healthy portion of the press; and especially to an admirable article which has lately appeared in the *Standard*. The writer shows a thorough knowledge of the subject, and he has not been taken in by the alleged Report of the Scurvy Committee, which was published by the *Sanitary Record*, and which has misled many others.

CHILE.

The publication of the interesting Report by Mr. Horace Rumbold, H.M.'s Chargé d'Affaires and Consul-General in Chile since 1872, and of the second volume of the *Anuario Hidrografico*, by Captain Vidal Gormaz, have recently obtained for the Republic of Chile an amount of attention among geographers and general readers which the subject well deserves. The progress of this rising State has been marvellous since the days of its war of independence, when so many books were written about it; while its physical features, its history, and the exploration of the little-known regions to the south, must ensure for Chile special interest in the minds of all geographers whose thoughts are not confined to one region, or one quarter of the globe. Yet, until the appearance of Mr. Rumbold's Report, very little of any value had been written, in England, respecting the Chilian Republic within the last few years; and reliable information was not readily accessible. It seems opportune, therefore, to pass briefly in review the principal events in Chilian history and geographical research; and to refer, at the same time, to the various sources of information respecting the most flourishing of the Spanish American Republics.

Mr. Rumbold describes Chile as a strip of coast-land pent in between nearly the loftiest mountains and the broadest ocean of the globe, and containing 220,000 square miles. It extends for 2270 miles in length, from the frontier of Bolivia in 24° S. to Cape Horn in 56° 29′ S.; its width varies from 40 to 200 miles; and the principal part may be described as one broad valley running north and south, with narrower, lateral, and intersecting valleys, each rising step-like above the other to the foot of the giant wall of the Andes. The main physical feature is the mighty cordillera towering above these fertile valleys, with a mean height of 11,830 feet, but with numerous far loftier peaks. Among these there are twenty-three volcanoes. Aconcagua, to which peak Fitzroy and Beechey gave an elevation of 23,910 feet, has been reduced by Pissis to 22,296. Tupungato rises to 20,269 and Villarica to 15,996 feet. Extending over so many parallels of latitude Chile necessarily has a variety of soils and climates. In the north is the sandy desert of Atacama, rich in mineral wealth; central Chile is agricultural, and contains all the principal cities and sea ports; while in the south are the forests and lakes of a colder and more rainy zone. The rivers flow rapidly from the Andes to the Pacific, the largest, the Bio-bio, only having a course of 220 miles.

There is some difficulty respecting the affinities of the aboriginal inhabitants of northern and central Chile, caused partly by the fact that there was considerable mixture with the Peruvians before the Spanish conquest, and that many Quichua words had crept into the Chilian dialects. The very name of Chile is probably the Quichua word *chiri** (cold). The Ynca Garcilasso de la Vega tells us that his ancestor, the great Ynca Yupanqui, of Peru, was the first to undertake the conquest of Chile, and his expedition brought the first tidings of this distant southern land. The Ynca's army crossed the desert of Atacama in about 1460 A.D., and reached a populous district called Copayapu, the modern Copiapo. Thence the Ynca General, Sinchi Rucca, advanced to Cuquimpu, and onwards to what Garcilasso calls "the valley of Chile, from which the whole country took its name of Chile." This, I suppose, is the valley of the Mapocho, in which Santiago, the present capital, is situated. The Yncas reached the banks of the River Maule, but here they found their match in the warlike Purumauca Indians, afterwards called by the Spaniards Promaucaes, who resolved to die rather than lose their ancient liberty, and they were joined by the tribes called Pincus (Pancones of the Araucana) and Cauquenes. A desperate battle, lasting four days, obliged the Yncas to retreat, and to fix the River Maule as the southern boundary of their empire. Ercilla says that they lost their camp and all their ensigns.* It would appear that the Yncas had been thus established in northern and central Chile for nearly a century before the Spanish occupation.

---

* Not "*Tchile*, the Peruvian word for snow," as the new edition of the *Encyclopædia Britannica* tells us. *Riti* is the Peruvian word for snow.

The famous march of Diego de Almagro into Chile with 570 Spaniards, and a large Peruvian contingent under the Ynca Paullu, took place in 1536, but the enterprise was abandoned in 1538. Three vessels were prepared to bring provisions by sea, but one under Juan Fernandez was detained at Callao, and the other, under Alonzo de Quintero, ran on shore off Pisco. The third, named 'Santiguillo,' arrived safely on the Chilian coast; and when the news reached Almagro, he sent the commander of his vanguard, a young soldier named Juan de Saavedra, to communicate. Saavedra found the little vessel in a port to which he gave the name of his own native village in Spain, a place called Valparaiso near Cuenca, which he was never destined to see again. He was hanged at Lima by the cruel Carbajal.

Almagro returned to Peru to misfortune and death, and the famous Pedro de Valdivia was destined to be the first permanent settler in Chile. In 1540 he marched southwards, and founded the city of Santiago, on the Mapocho, on the 24th of February, 1541. He opened a rich mine at Quillota, and, after receiving reinforcements under Francisco de Villagran, he defeated the dreaded Promaucaes, advanced far to the south, temporarily subdued the Araucanians, and founded many fortified settlements, including Imperial, Angol, Chillan, Valdivia, Villarica, and Concepcion. On the 3rd of September, 1544, Valdivia confirmed the name of Valparaiso, given by young Saavedra, for the port of Santiago, making a noble Genoese sea-captain, named Juan Bautista Pastene, its first governor. The rising of the Araucanos, the battles which ensued, the treachery of Lautaro, and the final capture and death of Valdivia, form the most romantic episode in the *Araucana* of Ercilla, and the story is also well told by the Ynca Garcilasso.†

These early conquerors tell us little respecting the natives of Central and Northern Chile; but it may be gathered that the inner valleys were inhabited by a people more allied to the Araucanos than to the Yncas, while along the Chilian coast dwelt a peculiar tribe of fishermen called *Chancos*, who are still met with at Cobija, and other ports of the desert. In Atacama there is still a tribe with a peculiar language, vocabularies of which have recently been collected, and which is quite distinct from Quichua or Aymara. It would appear from what Vicuña Mackenna says of the Chancos, in his learned *Historia de Valparaiso*, that the words of their language are to be found in the Araucan dictionary of Padre Febres; and we may, therefore, suppose that this tribe of the sea-coast advanced northwards to the confines of Peru, from the Araucan country.

When the news of Valdivia's death arrived in Europe, King Philip was in England, and among the numerous volunteers for service in Chile was one of his pages, Don Alonzo de Ercilla. This young soldier and poet served against the Araucans from 1554 to 1562, under Don Garcia Hurtado de Mendoza, afterwards Marquis of Cañete and Viceroy of Peru. Never had a people fighting for independence such a poet to record their valour in the ranks of their enemies. This is the glory of Ercilla's epic. He enlists the sympathy of his readers for the very foes who, in almost daily encounters, were seeking his life. His cantos may be too minutely topographical and too detailed, and he may often transgress in other ways by disregarding the rules of poetry; nevertheless, there is the ring of true metal in those stirring cantos of the young soldier-poet, written by the camp fires, night after night, after the battles were lost or won. No one who wishes to know anything of Chile should fail to read the *Araucana* of Alonzo de Ercilla. There is a complaint against him that he scarcely mentions his general, Hurtado de Mendoza, because that famous commander once punished him for having drawn his sword upon a comrade during a tournament. But the omission is abundantly made up for by that general's biographer, Suarez de Figueroa,* whose work should also be read by the student of Chilian history. A Chilian named Pedro de Oña, in his *Arauco domado*, continued Ercilla's narrative down to 1596.

In 1599, Martin Garcia de Loyola, the Governor of Chile, was slain by the Araucans. He was a nephew of Ignatius Loyola, and husband of an Ynca princess. At the same time, the Spanish towns of Valdivia, Imperial, Angol, Chillan, and Concepcion were destroyed, the male inhabitants killed, and the women carried away into captivity. The periodical wars continued without intermission until 1640, when at last the Marques de Baides, Captain General of Chile, through the intervention of the Jesuit Missionaries, made a treaty with the Araucans.

Meanwhile, Central and Northern Chile were becoming settled, towns were rising up, the population was increasing, and a trade was springing up with Peru. Mr. Rumbold is mistaken in supposing that Chile was disliked by Spanish officials. The settlers were chiefly from Biscay and Aragon, and they found a delightful temperate climate and fertile soil in the country of their adoption. The Captains-General sought the appointment, because it was a stepping stone to promotion, and several of the ablest Viceroys of Peru received their training in administration at Santiago de Chile, including the Marques de Cañete, Manso the Conde de Superunda, Amat, Jauregui, and O'Higgins.

The name of O'Higgins is indissolubly connected with Chilian history, and the story of the elder O'Higgins is so romantic that we cannot refrain from relating it. Ambrose Higgins was an Irish lad, born near the castle of Dangan, and his first employment was to carry letters to the post for Lady Bective. He had an uncle, a priest at Cadiz, to whom he was sent to be educated, and in course of time he found his way to South America, keeping a little shop under the Cathedral at Lima. He went thence to Chile, and, having shown some engineering talent, he eventually obtained a commission in the army. Having distinguished himself in a campaign against the Araucans, young Higgins received the chief command at Concepcion, where he entertained La Perouse, who wrote so strongly in his favour, that the French King applied to the Spanish Government for his promotion. So the young Irish post-boy at last became Captain General of Chile, and he then seems to have placed the O' before his name. Vancouver gives some account of him in one of the latter chapters of his narrative.

---

* G. de la Vega, Comm. Real. I., lib. vii., cap. 20. *Araucana* I., Canto I., i. p. 14 (ed. Madrid, 1776).

† I. lib. vii., cap. 23.

* *Hazañas del Marques de Cañete*, por Suarez de Figueroa.

O'Higgins was one of the best rulers Chile ever had. He ameliorated the condition of the labourers, by suppressing the "encomiendas," or fiefs, in 1791, made the excellent road from Santiago to Valparaiso; and sent home money to his poor relations in Ireland, through Mr. Kellett, the clergyman of the parish. Finally, Don Ambrosio O'Higgins was created Marquis of Osorno and Baron of Ballenar, and was Viceroy of Peru from 1796 to 1801. The Viceroy had a strong Irish brogue. His son Bernardo was the General in the war of Chilian Independence.

The most complete history of Chile, during Spanish times, is contained in the elaborate history by Don Claudio Gaye; but the works of Molina and of Father Alonso de Ovalle, both of which have English translations, should also be read by inquirers who wish to have an adequate knowledge of the subject.

Chilian independence was at first secured without a blow. The Captain-General Carrasco was replaced by Don Mateo Toro y Sambrano, Conde de la Conquista, and on September 18th, 1810, the new government was proclaimed. The first congress peacefully assembled in June 1811, and enacted many reforms, including steps for the abolition of slavery. Harmony was, however, destroyed by three ambitious brothers named Carrera, who, in December 1811, forcibly dissolved the Congress, and made themselves arbitrary rulers. This gave a pretext for the Peruvian Viceroy Abascal to send an invading force under General Pareja, which landed at Talcahuano early in 1813, and occupied Concepcion. José Miguel Carrera advanced against the Spaniards, who took refuge in Chillan, where Pareja died. Then followed numerous skirmishes, in which young Bernardo O'Higgins, and another Irishman named Mackenna, from County Monaghan, specially distinguished themselves. The Carreras were taken prisoners, and O'Higgins then took command of the patriot troops, while Don Francisco de Lastra became Supreme Director in 1814. In the same year, the Spanish General Gainza arrived with reinforcements from Peru, seized upon Talca, and entirely defeated the patriots at Cancha-rayada. The Carreras were released, and again brought confusion with them, seizing the reins of government at Santiago, and deposing Lastra. A treaty had been signed with the Spaniards at Talca, but the Viceroy of Peru refused to ratify it, and demanded unconditional surrender. More reinforcements were sent from Lima under General Osorio, and a Spanish army marched upon Santiago. The elder Carrera and O'Higgins advanced to the south as far as Rancagua, where the latter barricaded the streets, but Carrera held aloof, and in fact proved himself to be a traitor. On October 1st, 1814, the Spaniards attacked Rancagua, and there was a desperate action, which lasted for thirty-six hours. O'Higgins made a final stand with a handful of men in the central plaza, until, badly wounded and seeing that all was lost, he cut his way through the enemy's ranks, and escaped with a handful of men. The Carreras abandoned Santiago without a struggle and fled to Buenos Ayres,* followed by O'Higgins, with 1400 fugitives, including many ladies, who were hospitably received by General San Martin at Mendoza.

For three years Spanish power was again dominant in Chile. Osorio entered Santiago in triumph, where he arrested many of the principal citizens, confiscated their estates, and sent them prisoners to the island of Juan Fernandez. His troops indulged in unrestrained robbery and licentiousness, and his successor, Marco, even excelled Osorio in tyranny and oppression. But the people were unsubdued. A barrister named Manuel Rodriguez raised bands of patriot guerillas in the north, while others under Freyre and Neira seized Talca, and harassed the Spaniards in Southern Chile.

In 1816 General San Martin, the Argentine General at Mendoza, matured and executed one of the most brilliant military manœuvres of this century. He resolved to cross the Andes with an invading army, and to drive the Spaniards out of Chile. His first aim was to divert the attention and divide the forces of Marco, by making him believe that the attempt was to be made by the pass of El Planchon to the south, opposite to Talca. With this object he went to San Carlos from Mendoza, and held a grand palaver with the Pehuenche Indians, for leave to march through their territory to El Planchon. This news reached the Spanish Captain-General, who sent a large detachment towards Talca. The real intention of General San Martin was to cross the Andes by the pass of Uspallata to Aconcagua, north of Santiago. The army left Mendoza on the 17th of January, 1817, consisting of 3000 infantry, 960 cavalry, the staff and hospital train, besides workmen. All the men were mounted on mules, of which there were 7359 for the saddle and 1922 for baggage. The provisions consisted of jerked beef, seasoned with capsicum, toasted corn, biscuit, cheese, and onions. The field-pieces were slung between two mules when on tolerably smooth ground, but often it was necessary to drag them on kind of sledges made of dried bullock hides, called *sorras;* and even to hoist them up very bad places, or lower them down with derricks. Depôts of provisions were formed at every 12 leagues. The sufferings of the troops were very severe; all suffered from the rarefied air and intense cold, and several died. The pass of Uspallata is 13,125 feet above the sea, and the line of perpetual snow in that latitude is at about 13,000 feet.

---

* Their history has been written in a voluminous work by Don B. Vicuña Mackenna, entitled *El Ostracismo de los Carreras.*

On the 7th February, 1817, the vanguard of the patriots drove in a Spanish piquet, and San Martin occupied Aconcagua and Santa Rosa. The main body of Spaniards was posted near Chacabuco under General Moroto, on the direct road from Aconcagua to Santiago, and as reinforcements were rapidly countermarching from the south, it was necessary for San Martin to attack at once. The battle of Chacabuco was fought on the 12th of February, 1817. The main body of the patriots advanced up the cuesta of Chacabuco, while a detachment under Soler made an oblique movement to the right. O'Higgins, leading the infantry, commenced the attack, and was repulsed with severe loss, but San Martin followed with a desperate cavalry charge, and Soler following upon the enemy's left flank at the same time, there was confusion, and the victory was completed by a gallant charge of Colonel Necochea. The patriots entered Santiago in triumph on the 14th February, 1817; Marco was taken prisoner, and Bernardo O'Higgins was elected Supreme Director of Chile.

The Viceroy of Peru, Pezuela, then equipped one more expedition under his incapable son-in-law Osorio, which landed at Talcahuano in December, 1817, completing the force there to 6000 men. O'Higgins and Las Heras were at that time investing the place, and they fell back to Talca. In March 1818, Osorio crossed the Maulé, and his vanguard was driven back at a place called Quechereguas. San Martin and O'Higgins had about 8500 men of all arms. On meeting with a check, Osorio countermarched towards the ford over the Maulé, and San Martin advanced in a parallel line to cut off his retreat. The Spaniards reached Talca first, and some sharp skirmishing took place on the plain of Cancha-rayada, followed by a night attack, which threw the patriots into confusion. The army was saved by the presence of mind of Las Heras, and eventually retired to the line of the Maypu, 2 leagues from Santiago, in good order. At this time Captain William (afterwards General) Miller had joined the patriot cause as a captain of artillery.*

The two armies met, and the decisive battle of Maypu was fought on the 5th of April, 1818. The engagement had not lasted an hour when the Spaniards gave way at all points, 2000 were killed, 3500 taken prisoners, and Osorio escaped to Talcahuano. This victory finally established the independence of Chile. The next measure was to organise a fleet, which at first consisted of some old Indiamen that were purchased. In November 1818, Lord Cochrane arrived at Valparaiso to take the command; and in February 1820, the forts and town of Valdivia were taken from the Spaniards by a schooner and brig led by Cochrane, with Miller in command of the land forces. Talcahuano and Concepcion also fell, and in August 1822, Lord Cochrane conveyed the liberating army from Valparaiso to Peru. The Spaniards were driven out of their last stronghold on the island of Chiloe in January 1826.

The war of independence, and the enlightened policy of Mr. Canning, drew much public interest to Chile in the years immediately following, and many books of travel in Chile were published. Among these were two quartos, with several illustrations, by Maria Graham (1824) and Schmidtmeyer (1824), the travels of Caldcleugh (1825), Stephenson, Mathison, Scarlett, Sutcliffe, the work of Myers, the journal of Captain Basil Hall (1825), and the charming memoirs of General Miller; while Lord Dundonald more recently gave us an account of his proceedings when in command of the Chilian fleet.

Although the independence is dated from September 18th, 1810, it has only actually lasted for fifty years, during which time a very backward and misgoverned colony has been converted into a civilised and most prosperous republic. O'Higgins held office until 1823, when the unpopularity of his minister obliged him to resign, and he was succeeded by General Don Ramon Freyre. He retired to the sugar estate of Montalvan, in the valley of Cañete, in Peru, where he died in 1842. Freyre was succeeded by General Blanco in 1827, and died in 1851. In 1828 Don F. A. Pinto became President, and in 1829 Don Francisco Ramon Vicuña, who married a daughter of the gallant Irishman, Mackenna, and whose son is the well-known Chilian statesman, Don Benjamin Vicuña Mackenna. In 1830 Don José F. Ovalle succeeded, who died in office the same year, and Don Joaquim Prieto was President of Chile during two terms, from 1831 to 1841. The present Chilian constitution was promulgated in 1833. General Don Manuel Bulnes, who had led the Chilian contingent in the war with Peru, and overthrown the Dictator, Santa Cruz, at the battle of Yungay in 1838, succeeded President Prieto, and held office from 1841 to 1851, when he was replaced by Don Manuel Montt.

The accession of Montt was a bitter disappointment to the liberal party, and General Cruz, the defeated candidate, took up arms. General Bulnes, the outgoing President, took command of the Government forces, and entirely defeated Cruz at Loncomilla, after a hard-fought and very sanguinary engagement. Mr. Rumbold observes, that "the lesson Bulnes then taught his countrymen was that the military element in any well-ordered community, with free institutions, must accept subordination to the lawful civil authority. He gave the death-blow to militarism in Chile, and when, in 1859, at the close of Montt's second term of office, fresh disturbances arose, they were easily quelled by a staunch and undivided army." Montt was succeeded in 1861, by Don José Joaquim Perez; who was followed in 1871 by Don Federico Errazuriz, and on September 17th, 1876, Señor Pinto became President of Chile.

Having thus given a slight general sketch of the political history of Chile, we may now follow Mr. Rumbold in his description of the country, and his report on its moral and material progress.

In the northern provinces of Atacama and Coquimbo are the silver mines of Puquios, Tres Puntos, Chañarcillo, Chimbero, and many others. The desert was explored for the Chilian Government, about twenty years ago, by Dr. Philippi, who reported the existence of silver and copper in abundance, gold, iron, lead, nickel, cobalt, borax, nitrate of soda, and rock salt. In the thirty years from 1843 to 1873, the mines of Atacama yielded annually, on an average, 1,320,000*l.* In the southern part of this region is the Department of Freyrina, containing the highly cultivated vale of Huasco, and famous as one of the greatest copper districts in the world, the adjoining province of Coquimbo being almost as rich. Here are the large copper smelting works of Urmeneta and Errazuriz, and the rich mines of Carrizal, Panulcillo, and Tamaya.

---

* See his life, with a list of all Europeans who served in the war of Independence, in the appendix to *Travels in Peru and India*, by Clements R. Markham, (Murray, 1862).

Central Chile comprises the provinces of Aconcagua, accounted the garden of Chile, Santiago, Valparaiso, Colchagua, Talca, Maule, and Ñuble. Here are the largest estates and the most important towns, and Central Chile is distinctly agricultural, as distinguished from the mining north, and the wilder and more pastoral south.

South Chile commences at the River Itata, and includes the provinces of Concepcion, Arauco, Valdivia, Llanquihue, and Chiloe. It is only in part subdued, and in many districts the Araucans are still independent. Here are large coal fields, the climate is moist, and the soil excellent, the harbours are numerous and commodious, the forests which clothe the river banks, and cover the Island of Chiloe,* yield excellent timber, and the country is well adapted for stock breeding. The German colonies at Valdivia and Port Montt are prosperous, although the government has failed to attract a steady stream of immigration.

On April 19th, 1875, the population of Chile was reported to be 2,068,424 souls, an increase of 13·7 per cent. since 1865. At Santiago the population is 180,000, and at Valparaiso 100,926. The independent Indian population is roughly estimated at 44,000, including Patagonians, but it is believed that the number is nearer 70,000.

Great progress is reported in the department of education. In 1874 there were 806 public elementary schools in Chile, with 62,244 scholars of both sexes, besides 478 private schools with 23,198 scholars; the proportion being one scholar out of 4·94 children of educational age. There are also four normal schools for teachers. Higher education is provided for by seventeen colleges or lyceums in the provinces, and the University of Santiago, which confers degrees in law, medicine, and surgery, and diplomas in civil and mining engineering. The expenditure on education for 1876 was 233,414*l.*

The budget of 1876 for ordinary expenditure was 3,366,080*l.*; of which the military and naval expenditure together was 636,096*l.* The strength of the army is fixed at 3573 officers and men, the bulk of the force being quartered on the Araucanian frontier; it is small but thoroughly efficient. The national guard consists of 21,951 men. The navy consists of an iron-clad of 2032 tons, the 'Almirante Cochrane,' and the 'O'Higgins' (7 guns), 'Chacabuco' (7), 'Esmeralda' (12), 'Magellanes' (4), 'Abtao' (5), 'Covadonga,' a gun-boat captured from the Spaniards in 1864, 'Ancud,' 'Tolten,' 'Independencia,' and 'Valdivia,' a total tonnage of 10,095. The 'Valparaiso,' an iron-clad and sister ship to the 'Almirante Cochrane,' was launched in England in May 1875. The navy estimates amount to 244,597*l.* The merchant navy of Chile consists of eighty-seven vessels, of which twenty-two are steamers; but there would be a large increase if the oppressive Navigation Laws of 1836 were abrogated.

In our number for May 1873, p. 73, we noticed the admirable surveying-work that had been done by the Chilian naval officers, especially in the Bay of Reloncavi, separating the coast of Chile from the island of Chiloe; and our number for June 1876, p. 160, contained a review of the first volume of the *Anuario Hidrografico de la Marina de Chile.* The second volume, comprising the work for 1875, is now before us, and it shows that the navy of Chile continues its meritorious exertions in the best and most important work on which a navy can be employed. The present volume contains an admirable memoir on the nautical geography of the Bolivian coast, by Captain Vidal Gormaz, the hydrographer; reports on the surveys of parts of the coast near Valparaiso, by Captain Pomar, in the 'Ancud,' and of a portion of Magellan's Strait, by Captain Simpson, in the 'Chacabuco'; a narrative of an interesting voyage made by Captain Lopez in the 'O'Higgins', including a visit to Easter Island; sailing directions for the River Plate; and the usual well-digested information respecting lights, positions of dangers and wrecks, the whole illustrated by numerous charts.* A full account of the government topographical map of Chile, by Pissis, will be found in our number for April 1874, p. 31.

The ordinary revenue of Chile, in 1874, amounted to 3,080,164*l.*; and the extraordinary revenue, including interest from the loan of 1873, brought it up to 3,133,344*l.* In 1875 the revenue yielded 3,220,000*l.*, and in 1876 it is estimated at 3,330,741*l.* As in other countries, including British India, great expenditure had been sanctioned on public works which were expected to be remunerative, and this outlay has sensibly disturbed the equilibrium of Chilian finance. The sources of revenue are various, two of the taxes being legacies of Spanish rule. These are the tobacco monopoly, and the *alcabálas* or taxes on the transfer of property. There are also taxes on revenues derived from land, on trading and other licenses, but by far the largest item is derived from customs duties.

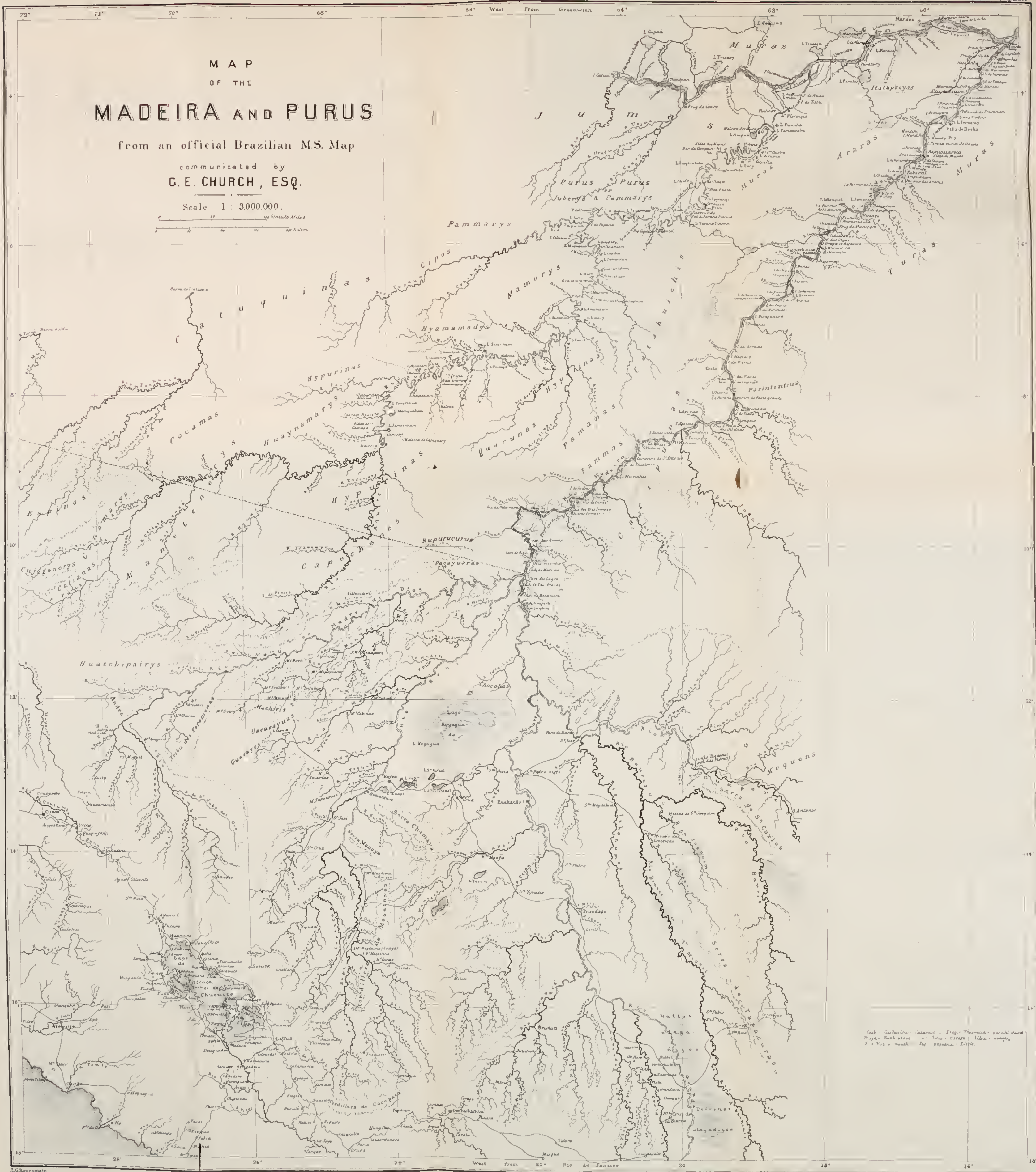
The total amount of the Chilian foreign debt is 8,137,800*l.*, and the internal debt is 2,185,920*l.*; the whole debt being about three years of the revenue. The charge for interest and amortization of the foreign debt is 676,000*l.*, and for internal debt 263,403*l.* The first money was borrowed in 1822, wherewith to achieve independence. This loan was raised in London at 6 per cent., and amounted to 934,000*l.* In 1842 the interest in arrear was capitalized at 757,500*l.*, with interest at 3 per cent; and since that time the most scrupulous good faith has been kept with the public creditors.

In 1858 Chile raised a loan of 1,554,800*l.* in the London money market, which was taken at 92. The war with Spain obliged Chile to borrow again, in 1866, 1,120,920*l.* at 7 per cent. In 1867, another loan of 2,000,000*l.* at 6 per cent. was raised, being specially secured by the general customs revenue; and in 1870 another loan of 1,012,700*l.* was raised, for the railroad from Chillan to Talcahuano, at 5 per cent. Lastly, in 1873, a loan was effected of 2,276,500*l.* at 5 per cent., for the railroad from Curico to Angol. "The credit of Chile," says Mr. Rumbold, "stands deservedly higher than that of some larger and more powerful States;" but the tendency to

---

* See an account of Chiloe, by Captain Blanckley, of H.M.S. 'Pylades,' written in 1834.—*Royal Geographical Society's Journal*, iv., p. 344.

* *Anuario Hidrografico de la Marina de Chile.* Año II. (Santiago de Chile, 1876.)



MAP OF THE MADEIRA AND PURUS

from an official Brazilian M.S. Map

communicated by

G. E. CHURCH, ESQ.

Scale 1 : 3.000.000.

E.G.Ravenstein.

borrow for the construction of remunerative public works is one that should be very jealously watched.

The system of railway communication is progressing rapidly. There are the lines from Valparaiso to Santiago, with a branch to Santa Rosa; that to the south from Santiago to Curico; that from Chillan to Concepcion, and there are to be lines from Curico to Angol, and thence still further south. There are also projects for constructing lines across the Andes to the Atlantic. Mr. Wheelwright's scheme was for a line from Caldera, over the San Francisco Pass (16,023 feet) to Cordova*; and other surveys were made for a line much further south, across the pass of El Planchon† (8225 feet). Messrs. Clark, who made the Transandine Telegraph, have a third scheme for a line from Mendoza to Santa Rosa, over the Uspallata Pass, which has been carefully surveyed. The engineer for this line was accompanied by Mr. Granville Milner, H.M. Vice-Consul at Santiago, and we hope, in a future number, to give a narrative of the journey over the Uspallata Pass from the pen of this able and zealous young diplomatist. We noticed the mineral railways in the Copiapo province, constructed from 1849 to 1854 by Mr. Wheelwright, in our notice of Señor Alberdi's life of that great contractor.

But it is to the Pacific Steam Navigation Company that Chile mainly owes its first and most important advances in material prosperity. Some account of it will be found in our account of the life of Mr. Wheelwright, at page 130 of our number for May 1876. The Company's steamers, which go direct to England, by the Straits of Magellan, twice a month, take an average cargo of 2500 tons, composed of chinchona bark, wool, sugar, cocoa, and copper; so that 65,000 tons of valuable merchandise are thus annually conveyed to Europe. The Company's steamers also carry the bulk of the local trade on the Peruvian and Chilian coasts.

Mr. Rumbold gives very complete details respecting Chilian trade. He concludes his most valuable report with some well-deserved, and certainly not too highly-coloured praise of the Chilian Republic, "a sober-minded, practical, laborious, well-ordered, and respectable community. . . . . The blessings which Chile enjoys she owes to the pure traditions implanted in her administration by the founders of the Republic; to the preponderating share taken in public affairs by the higher and wealthier class; to the happy eradication of militarism, and to the patient endurance and capacity for toil of her hardy population." She also owes not a little to English energy and assistance, to the Cochranes, and Millers, and Wheelwrights, who served her with such energy and zeal. No one who has visited the brave little Republic which nestles under the shadow of the mighty Andes, and has known and appreciated the generous and noble character of her people, can fail to cherish happy memories of their visit. Chile has many warm well-wishers in England.

---

* *Royal Geographical Society's Journal*, xxi., p. 155 (1861).

† *Royal Geographical Society's Journal*, xliii., p. 46 (1873). See also the interesting account of an expedition across the southern Andes, led by Don Guillermo Cox in 1862, from Port Montt and over the pass of Boquete de Royalez (2794 feet) to Lake Nahual-huapi, and back by the Ranco or Lifen Pass (2760 feet) to Valdivia. This seems to be a still easier route.—*Royal Geographical Society's Journal*, xxiv., p. 205 (1864).

THE RIVER PURÛS,

In its Commercial and Geographical Relations to the Valley of the Madeira.

Much has been said of this river as an available avenue for Bolivian commerce. It has been frequented of late years by the rubber collectors, but no exploration, even approximately reliable, has been made of its course except by Chandless in 1864-5. The Brazilian Government had caused four rude examinations to be made previous to the voyage of Chandless, but the meagre data they collected was of little value, except to prove the Purûs to be an important navigable tributary of the Amazon.

Chandless ascended the Purûs 1866 miles. At 1792 miles above its mouth, it separates into two small branches. It may be said that the river is navigable in light draught steamers as far as the Curumahá, a little stream 1648 miles from the Amazon. Its branches will probably add 800 miles more of navigable waters to the parent river. The Aquiry, which enters the Purûs 1104 miles from the Amazon, is reported to be a river as wide but not so deep as the Purûs.

The distinguished traveller, Richard Spruce, states that when, in 1852, the upper Amazon province was separated from that of Pará, the Assembly of the new province dispatched Serafim da Silva Salgado, instructing him "to seek a passage to the towns of Bolivia, by the River Purûs and the savannahs of the Beni, shorter than that by the Madeira, and free from the cataracts of that river."

Salgado was completely unsuccessful in the object of his voyage.

Chandless states that the Brazilian Government dispatched Manoel Urbano in 1860 on an expedition similar to that of Salgado, with the hope of finding water communication between the Purûs and the Madeira above the rapids of the latter river. Urbano ascended the Aquiry a distance of about 400 miles until stopped for lack of water, and failed to discover the communication sought for.

The Purûs is probably as crooked as any river in the world. Its length in a straight line is less than half its length measured by the curves of the river. Its bends are frequently very sharp, rendering navigation exceedingly difficult, except by very short vessels.

Chandless* says:—"It remains only to make some general observations on the geography of the Upper Purûs. From the small size of both branches at the farthest point I reached, and their rapid diminution, it is pretty clear that they cannot come from any *very great* distance; in my opinion little, if at all, to S. of 11° S. latitude—certainly not from the Cordillera." . . . . "If, therefore, the river I followed be, as it has hitherto been considered, the true Purûs, then the Madre de Dios is certainly not the source of the Purûs."

I possess a map, kindly made especially for me by the Topographical Department of the Brazilian Government, giving much geographical data, from the rich collections of the Government, relative to the River Madeira, its affluents, and the region of the River Purûs. According to Chandless and my Brazilian map, the sources of the Aquiry branch do not reach further than 11° 20′ S. latitude.

---

* See Chandless's "Notes on the Purûs," *Journal of the Royal Geographical Society*, 1866.

The head waters of the Madre de Dios to the east of Cuzco, to which many travellers have penetrated, supposing them to be the sources of the Purûs, lie between 12° 30′ and 14° 30′ S latitude, and water the great Carabaya slope of the Andes—probably as rich in auriferous deposits as any equal area upon the surface of the globe.[*] Instead of being the sources of the Purûs, they are evidently those of the great branch of the Beni, named by Padre Revello, "the Madre de Dios," and by the Quichua Indians the Amaru-Mayu, or Serpent river, and by the Tacana Indians, who extensively populate almost its entire course, the Mayu-tata. It is stated by those who have visited it to be equal in volume to the Beni, and to be, perhaps, the main stream. This is not improbable, for Keller gives the Beni, by actual measurement, a volume at its mouth as great as that of the Mamoré and the Guaporé united.[†] The Mayu-tata enters the Beni probably among the rapids near its mouth. Both the Beni and the Mayu-tata deserve attention, as offering perhaps the most important problems for geographical solution presented upon the western continent. Professor Orton, of Vassar College, has lately proceeded to Bolivia with a view of exploring these rivers, and it is to be hoped that this indefatigable *savant* will soon lay before the world the results of his voyage through a region where nature is riotous in the prodigality of her gifts.

It is notable that the Jesuit Father Eder, in his *Descriptio Provincial Moxitarum in Regno Peruano*, gives upon his accompanying map the Amaru-mayu river as a part of the Lower Beni.

It is possible that the Jesuits in the last century were aware of the course of this river, for, in descending the Mamoré, I learned that the tradition existed that the Jesuits were in the habit of descending the Beni river to its mouth from the Mission of Reyes, and that they occasionally made excursions into the territory to the west and north-west of the mouth of the Beni.

In 1866, two Franciscan friars, from the convent at La Paz, penetrated to the Mayu-tata from the Mission of Cavinas. In December of 1869, at the convent, I met one of these friars, Padre Fidel Codinach, a Spaniard, who gave me some notes from the journal of his voyage: "In the Tacana language, Mayu is always applied to a large river, and Mayu-tata is the 'Great Father river.' The Mayu-lipi flows into the Mayu-tata from the south. Lipi means 'small.' Between the Madidi and the Mayu-tata, and including a considerable district to the north of the latter river, all the Indian tribes speak the Tacana language. It is almost totally different from either Quichua or Aymara, having but a few words in common with them. The Tacana tribes cannot count beyond six. South of the mouth of the Madidi, and between the Unduma and Tegeque branches of the Beni, is found the Mission of Ysiama. Near this mission passes an Ynca road,[*] which comes from the direction of Cuzco, and runs towards the bank of the Beni. The road is about 25 ft. wide, and long stretches of it, well paved, are still visible.

"The Mayu-tata is five days' journey north-west of Cabinas, the Franciscan Mission on the Madidi—a journey may be counted at 10 leagues. It is as large as the Beni, but has a more rapid current. The Indians say that to the north is another river as large as the Mayu-tata, and but a short distance from it.[†] They all say that the Mayu-tata flows into the Beni."

In direct translation from Padre Fidel's manuscript:

"*The Araonas* are a very extensive tribe, living along the northern shore of the Mayu-tata, but it is impossible to obtain exact data relative to them. An important fraction inhabit lands between the Beni and the great Madre de Dios. From information extended by them there are from sixty to seventy divisions, counting from ten to twenty families each. The principal part of the tribe inhabits the other side of the Mayu-tata, and, by their own calculation, number more than two hundred divisions."

The Toromonas.—"To the S.S.W. of the Araonas, and about five days' journey from Cabinas, are found the sociable Toromonas. According to the accounts given of them by the Araonas, with whom they associate much, they are gathered into important towns rather than into insignificant divisions. The towns are five in number, and each one numbers from two to three hundred families, apart from the suburbs of the great centres where numerous smaller settlements are found. The great mass of the tribe is found on that side of the Mayu-tata and among the head-waters of the Mayu-pari, a river of smaller size."

---

[*] Tradition has it that the gold-washers of this district once "sent 'a lump of gold' to the King of Spain the size and shape of a bullock's tongue, which was lost at sea; but in a little while they sent another piece of the size of a bull's head, which arrived safely."—Markham on "The Province of Caravaya," *Journal of the Royal Geographical Society*, vol. xxxi.

[†] Keller in speaking of the Caldeirão do Inferno, an important rapid of the River Madeira, says:—"Among the persons who have lost their lives at this rapid, we will only cite the Peruvian Colonel of Engineers, Maldonado, who, persecuted in his country for political motives some five or six years since, embarked upon the Madre de Dios, descended by this to the Beni, and by the Beni to the Madeira, dying at the rapid of Caldeirão do Inferno. He thus furnished material proof that the Madre de Dios is an affluent of the Beni and not of the Purûs. It is to be regretted that all the papers of Maldonado were lost on this occasion, two of the rowers alone barely saved themselves. They were ignorant men, who were unable to give extended information upon the region traversed."—*Vide Exploration of the River Madeira*, by Keller. Translated from the Brazilian Government Relatorio of 1869, by George Earl Church.

In the *Journal of the Royal Geographical Society*, page 94, vol. v., part i., 1835, I find a paper by Sir Woodbine Parish, on the explorations of Thadeus Haenke, member of the Academy of Sciences of Prague and Vienna. After accompanying Malaspina on his great voyage, he was sent on a scientific expedition to Peru by the King of Spain. Haenke says: "In October, 1794, the Chuntachitos, the Machuvis, and Pacaguaras Indians who live to the west of Apolobamba, gave me accounts of a very wide and deep river running through a flat and thickly-wooded country, about ten days' journey west of the Beni, where I fell in with them. They distinctly explained to me that a vast many Indians and their families were settled along its shores, that in their language it was called *Manoa*, and that it was a larger river than the Beni."

The *Panama Star and Herald*, of August 5th, 1873, quotes from *El Obrero de Cuzco* the following description of the voyage of young Maldonado:—"Accompanied this time with twelve others, he set out in the midst of the rainy season of 1860. On arriving at the confluence of the Piña-Piña and the Madre de Dios, they constructed a *balsa*, or raft, capable of carrying eight of them, and let themselves go by the stream. The current soon carried them within the limits of the savage tribes, against whose arrows they had to defend themselves for six days, until they came within the reach of savages more docile, from whom they bought a launch. In March they were at the confluence of the Mamoré, which leads up into Bolivia. There six took the launch with their baggage, and the two others followed in a canoe. The Indians endeavoured to make them understand that they must always avoid the left margin of the river. On the 18th of March they forgot the advice of the friendly Indians and crossed over to the left side. The launch upset and Maldonado, with three others, were drowned. The remainder found their way into the territories of Brazil, the authorities of which assisted them to get back to their native place, Tarapoto, where they arrived on the 1st of June."

[*] Can this be a road built by the Yncas to preserve their conquest of Mojos by the Ynca Yupanqui? It is very important to the history of the empire of the Yncas that more should be learned of this road, its course and extent.

[†] This must be either the Aquiry or the Purûs.

The Pacaguaras.—"Below and to the north of the Araonas is the Pacaguara tribe. Their divisions or clans are small and less in number than the others. They extend from the Beni to the Mayu-tata, and occupy both sides of each river, which is not strange; for, besides their wandering life, they occupy much less space from one river to the other than that occupied by the Toromonas and Araonas."

The Caviñas.—"In the midst of these three great tribes are found the Caviñas, no less inferior in numbers. A great number of them live mixed with the Araonas. This results from a long and bloody war, which, according to traditions, was for many years waged between them, until they made a treaty that the destructive contest should cease, and that the warriors of the Araonas should take wives from the Caviñas and *vice versâ*.

"Notwithstanding there are various divisions which, aside from the three already mentioned, live entirely separate."

Habits and Customs.—It may be said in reality that these are barbarous, but not so much so as is generally supposed. From observation, polygamy is permitted among them up to the number of two wives, but tribal divisions are numerous where the man has but one. In this particular I dare not say that they might serve as models for many of our Christian settlements; for during the whole time I lived among them, giving them attentive observation, I never saw a dishonest action nor heard unkind words. The men hold their wives in the greatest esteem, as well as their children. I have never seen among them any harsh treatment; on the contrary, even in household duties they render each other mutual assistance.*

"There is a complete subordination to their commander and to their priest. I judge that they have their own spiritual head in accord with their religion. I do not doubt but their kindness and certain class of cultivation in their treatment of women is the effect of the non-use of intoxicating drinks; for it has been observed that the Araonas, Toromonas, and Caviñas are frugal, abstemious, delicate, and even moral. With reference to the Pacaguaras, the contrary rules. They are dissolute and much given to that low passion drunkenness, so much so, that not even the women use, as in other tribes, the narrow belt.

"That which is intensely developed among them is idolatry, with great superstition; for every one of the tribal divisions, however insignificant, has its temple or place well adorned, where are found innumerable idols and gods, which consist of numerous little baskets, neatly made and filled with pebbles and little stones of various colours, and also of many sticks of well-polished ebony, carved with heiroglyphics. They worship everything, from the sun to their ancestors, distinguishing the latter by their ferocity or some similar virtue. They decorate these gods with wreaths delicately worked with feathers of various colours.

"Their towns are small, with exception of those mentioned. Each one has its captain and priest, and sometimes both these officers are united in the same person. All the divisions of each tribe are subject to two superior chiefs, one for the time of war, the other for time of peace. To these they render the same honours which they give to their gods. Those now in command are of very religious sentiments.

"With reference to their habits, the tribes vary little one from the other, notwithstanding each has its pecularities. The Toromonas are more hospitable, civil, and laborious. The Araonas are anthropophagi, although the young men preserve more moderation. The Caviñas are distinguished for their treachery, envy, and sagacity. The Pacaguaras are wanderers, having no fixed habitation. They are very suspicious, resolute, and revengeful.

"With reference to the lands occupied by these tribes, they are unsurpassed in beauty, as much for their topography as for their fertility and richness. They occupy a broad space about four degrees of latitude and about eight of longitude. The position is exceedingly agreeable—now extensive groves, which are suddenly replaced by delightful pasture lands—now by brooks, rivers, and ponds filled by numerous classes of fish. The most perfect salubrity of climate exists, despite the warm temperature. The groves are delightful and filled with all that gives pleasure. The leafy and productive almond tree,* the aromatic gum, and the palm, ranging from the highest to the lowest, from the royal to the smallest. Hidden riches exist in these lands, grateful and filled with perfume, gums and wax abundant and varied. Here are found cabinet-woods, medicinal plants, and products rich and appreciable, and many other valuable productions, without mentioning the great mineral wealth of the district.

"Finally, I conclude charging you that you pray to heaven, and do all within your power on earth with reference to your calling, that so many souls shall not remain forgotten and such beautiful lands remain uncultivated."

This calls vividly forward the subject of Paytiti, which, during the Spanish occupation of America, inflamed the imagination of Europe, and caused the organisation of many brave expeditions, which penetrated into the heart of South America in search of Paytiti, Manoa, and Omasuyos. No doubt this is the nearest approach to Paytiti that has ever been discovered; but I am inclined to believe that the advancement in ideas and customs, described by the good Padre Fidel, is the result of causes which, however traditional, have still some foundation in fact. It will be remembered that the cruelties of the Spaniards drove large numbers of the Ynca race to the forests of the Amazon, and especially to the east of Cuzco. Some of the Spanish rebel followers of the younger Almagro probably escaped into the Caravaya district in 1542.

When the Chunchos sacked the towns of San Gavan, Sandia, and San Juan del Oro, to the east of Cuzco, they probably carried most of the Spanish women to the forests, in the same way that the Jibaros did in their terrible uprising in South-Eastern Ecuador in 1599, and their destruction of Savilla del Oro and other populous towns. Juan Alvarez Maldonado[*] may have left many stragglers in his search for the 40,000 escaped Ynca Indians, east of Cuzco, beyond the Tono, where he had the three days' bloody battle with the rival expedition of Tordoya. The Spanish blood, mixed with that of the fraction of the Ynca race for nearly three centuries, may have given to the Tacana tribes we have described a claim to superiority.

---

* What a pity to disturb these tribes with "civilisation."

* Probably the Brazil-nut, which is called an almond in Northern Bolivia.

It was on the Tono[†] branch of the Mayu-tata that the Ynca Yupanqui, formed a settlement of the Indian tribes he conquered in his great military expedition to the east of Cuzco into the Beni and Mojos districts.

Lieutenant Gibbon of the U.S. Navy descended the mountains from Cuzco to the junction of the Tono and Piña-Piña. He found it to be 12° 32′ S. latitude, and 70° 26′ W. from Greenwich, and 1337 feet above the level of the sea. The river was 70 yards wide, but not navigable at this point. The Peruvian bark gatherers told him that, a short distance below, the river wound through a level country.

The farthest point reached by Chandless on the south branch of the Purûs was barely 40 yards' average width. He does not give its elevation, but the elevation of the point where the Purûs forks, 1792 miles up, he gives at 1088 feet, that is 249 feet lower than the point on the Mayu-tata reached by Gibbon.

The Madeira river, from the fall of San Antonio to its mouth, runs north-east, and the Purûs runs parallel with the Madeira for this distance. A right line drawn north-west from the fall of San Antonio cuts the Purûs at a point which I estimate by Chandless's measurements to be about 300 feet above the level of the sea. San Antonio is 202 feet, and the mouth of the Madeira 90 feet above the sea, according to Keller. This indicates that the Purûs from the point named runs through a valley more elevated than that of the Madeira below the falls, but with a greater incline towards the Amazon than the Madeira valley, although the numberless curves of the Purûs give it a gentler current than that of its sister stream.

The level of the upper fall of the Madeira is, according to Keller, 474 feet above the sea. This may be roughly estimated to be the level of the mouth of the Mayu-tata. This gives a difference of level of 863 feet between the point where Gibbon visited it and its entrance into the Beni, a length of river which will probably be found to measure at least 600 miles.

In comparing the relative elevation of the Upper Madeira Valley and the Upper Purûs, the mouth of the Mayu-tata, 474 feet high, corresponds with the mouth of the Aquiry, 364 feet high; and the Upper Purûs, from the point named, runs approximately parallel with the Mayu-tata. If these hypsometric observations are correct, they show that while the Lower Madeira is less elevated than the Lower Purûs, the falls of the Madeira make a distinct change in the relative elevation of both rivers, for the Mayu-tata branch of the Madeira runs along the north-western edge of a plateau higher than the valley of the Upper Purûs.

We have shown that the Lower Purûs is more elevated than the Lower Madeira, and the Upper Purûs less elevated than the Upper Madeira. A profile line of the Purûs would cut the profile line of the Madeira and its Mayu-tata branch at a point among the falls of the Madeira.

This question of the comparative elevation of the valley of the Madeira and that of the Purûs has been long in dispute among geographers.

There are few more delicate problems in hydraulic engineering than the ascertaining of the exact inclination of the surface of a great river, and few rivers of the world have been scientifically studied in all that relates to their tides, currents, sectional areas, and inclinations of surface and bottom. No river offers so magnificent a field as the Amazon for the study of river hydraulics.

There have been absolutely no scientific examinations of the Rivers Amazon, Madeira, and Purûs; and in the effort to determine the inclination of their surfaces, for the purposes of relative comparison, one is reduced to the measurements of the few explorers who have given us the results of the usual rough methods of ascertaining heights by the boiling point of water and the barometer. The various sectional profiles made by travellers across South America, by way of the Andes and Amazon, or *vice versâ*, show, when placed in comparison, an utter confusion of elevations —some of them sufficient to give the Amazon river a current of 10 miles per hour for the first thousand miles of its course above the sea.

Among the giant streams of the Western continent, the Parana appears to be the only one which has been measured with practical accuracy, and this for a distance of only 200 miles from the sea. This was done by Revy, by means of the current thrown back by the tidal wave of the Atlantic.* It gave a result of $\frac{44}{100}$ of an inch per mile as the surface inclination.

---

[*] It is stated by Alvarez Maldonado (who made an expedition in these distant regions shortly after the conquest), in an old record still preserved at Cuzco, that on the subjugation of the country and dethronement of the Yncas, about 40,000 Ynca Indians emigrated from Cuzco and its neighbourhood, traversed the valleys of Paucar-tambo, and penetrated east of the Amaru-mayu; that they established themselves in a colony on the banks of a great lake called Paytiti, were governed by a chief called the Apu-Huayri, and were then a great people. These facts are, in all likelihood, the sources from which Sir Walter Raleigh drew his fabulous account of the golden city of Manoa. which was also said to be on a great lake." *Cuzco and Lima*, C. R. Markham.

[†] Markham, in May of 1853, descended the mountains from Cuzco to latitude 12° 41′ S. and longitude 70° 30′ W., 103 miles from Cuzco. He says, "Near this point the Tono, with all its tributaries from the west, the Cosnipata from the south-west, and the Piña-piña from the north, having drained the wide forests of Paucar-tambo, unite and form that mighty river which I saw from a distançe, and which is here called the Madre de Dios or Amaru-mayu river, evidently the same as the Purûs."

It was very natural for Markham to suppose at that time that he was on the head-waters of the Purûs. for Chandless had not then explored the Purûs, and shown that its sources were a hundred miles to the north of where Markham then stood. Markham continues:—"If once the Madre de Dios or Purûs was thoroughly explored, the effects it would have on the industry and future prospects of Peru are incalculable The people of the interior of that beautiful country, the Ancient Empire of the Yncas, would at length succeed in turning the granite barrier of the Andes. . . . . An inland navigation would waft the varied productions of the interior of Peru—its bark, sarsaparilla, copaiba and india-rubber, its sugar, cocoa, cotton and tobacco, its alpaca, wool, silver and precious stones—by a direct and easy route to the Old World, and the dangerous journeys across the Cordilleras, and long tedious voyages around Cape Horn would be avoided."—*Journal of the Royal Geographical Society*, 1854, vol. xxv., p. 158, paper by C. R. Markham, F.R.G.S.

With a 14-inch levelling instrument, and staff and pegs, Revy practised a most accurate levelling operation on a 4800 feet length of the Paraná, above all tidal influence. The result gave no perceptible difference of level between the two points, owing to the slight ripple on the calm river and its unsteady surface.

It is doubtful if the Amazon be found to have a greater inclination than half-an-inch to the mile, between Manaos and the Atlantic, a length of 1000 miles. The elevation of Manaos above the sea is given:

By Herndon	at 1475	feet.
By Spix and Martius	,, 556	,,
By Orton	,, 199	,,
By Ozevedo and Pinto	,, 92	,,

The last-named would give $1\frac{1}{10}$ inch fall to the mile. Keller's observation of 90 feet elevation at the mouth of the Maideira would give $1\frac{2}{10}$ inch. The observation of Chandless, 590 miles up the Purûs, and 1700 miles from the sea, gave an elevation of 107 feet, or an average between that point and the sea of $\frac{75}{100}$ of an inch per mile.

At Tapajos, Bates observed the effect of the ocean-tide on the Amazon 530 miles from the sea. The rise of the tide at Pará, 70 miles from the sea, being but 12 feet, shows clearly that all the estimates giving to the surface of the Amazon an incline of even an inch to the mile are very excessive.

I have endeavoured, on this point of the fall per mile of the Amazon, to show that no absolute dependence can be placed upon the accuracy of the elevations given to us by the various explorers of the Madeira, the Mayu-tata, and the Purûs. My inferences relative to the important question of the comparative elevation of the valleys of these rivers are necessarily rude ones, but I am led to believe that the data upon which they are based is sufficiently correct to warrant them.

Explorations will probably show the Mayu-tata river to have falls and rapids for many miles of its course below the point which Gibbon or Markham reached, and that it would hardly be safe to suppose that it is navigable for steamers to a point nearer than 150 miles from Cuzco in a straight line.

Over this route, to the valley of the Mayu-tata, one naturally expects to see the Mollendo, Puno, and Cuzco Railway extended by the Government of Peru, if ever Peru expects to make the existing railway a financial success. The connection of this railway with a navigable point on the Mayu-tata river would be of inestimable value to South-Eastern Peru. Gibbon, in speaking of this river, says: "If it is navigable for steamboats to where we now see, it forms the natural highway to Southern Peru. All the silver and gold of Peru are not to compare with the undeveloped commercial resources of that beautiful garden."

The foot-hills of the Andes will probably be found to push themselves far down between the Purûs and the Mayu-tata. In my descent of the falls of the Madeira, I noticed short ranges of hills as well as some isolated ones of magnitude.

I have treated the subject of the Purûs at some length, for the reason that, in Bolivia as well as abroad, many have jumped at the conclusion that this river would afford a better avenue of communication with Bolivia than the River Madeira. On account of the data given and much other information which might be elaborated, I believe the Purûs to be totally unserviceable for Bolivian commerce. It would probably take at least a hundred miles of road to connect the head of navigation on the Aquiry branch of the Purûs with the Mayu-tata river. The Beni river would then be reached among the rapids near its mouth by descending the Mayu-tata, and still commerce would be cut off by rapids from the great Mamoré, Guaporé, and other streams which penetrate to the populated centres of Bolivia. An analysis of the Purûs route shows that it cannot be of use to Bolivia for many years to come, and then only to tap the extreme north-western frontier of the country.

The proper route to reach the valleys of the Beni and Mayu-tata is to cross the Mamoré river just above the mouth of the Beni, with a railway branching from the projected Madeira and Mamoré line, and, skirting the bank of the Beni front of the mouth of the Mayu-tata, terminate the road at the upper rapid of the Lower Beni. Such a branch line would not be more than thirty to forty miles in length, and would open two river valleys, the equals of which in richness of soil, agricultural, medicinal and mineral products have no superiors upon the western continent.

George Earl Church, F.R.G.S.

INDIAN MARINE SURVEYS, 1874-6.

The Department of Indian Marine Surveys has been officially organized during the latter year under review, and the provision of this most necessary work may therefore be said to be now permanently secured.

According to a resolution of the Government of India, published in the *Gazette*, the duties to be discharged are as follows:

Systematic surveys of the coasts of India are to be carried on with suitable vessels efficiently equipped and manned. These surveys are to be connected with the shore surveys, and closed in on points already fixed by the Great Trigonometrical Survey. The original surveys of ports, harbours, and river entrances will be photozincographed, and issued for local navigation and engineering purposes, and from them charts of the coast will be compiled on a medium scale for the purposes of general navigation. Copies of all original surveys will be forwarded to the Admiralty Hydrographer for publication; and all corrections of surveys and other information, such as notices of changes in the places of buoys, lights, &c., will also be transmitted at once to the same office. A catalogue of all the charts of the Department will be kept, besides a sufficient stock of Admiralty charts, and copies of these will be furnished to the Local Governments and public officers on demand. The Superintendent of Marine Surveys is also charged with the duty of compiling an annual chart of wrecks, an annual list of lights, with descriptions of them and their position, and sailing directions for the Indian coasts. He will report on the lighting and marking of the sea approaches to all great Indian ports and rivers; suggest improvements in harbour conservancy by means of buoys, beacons, and lights, and in the navigation of rivers throughout India. Any extracts from log books of vessels belonging to the Bengal and Bombay Marine, or to H.M.'s Squadron, which bear upon any discoveries, dangers, or errors in the charts of the Indian Seas, will be communicated to the Department of Marine Surveys, which, like all the other branches of the Survey, is affiliated to the Department of Revenue, Agriculture, and Commerce.

---

* *Vide* the *Hydraulics of Great Rivers, by* J. J. Revy.

The foregoing describes the nature of the duties. The agency by which they are to be discharged consists of a Superintendent (Commander A. D. Taylor, late I.N.), two Deputy Superintendents, and nine Assistant Superintendents, three executive officers, one Medical Officer and Naturalist, and a Superintendent of the Drawing Branch. The five surveying officers next in rank to the Superintendent belong to the Royal Navy, their services having been lent to the Indian Government by the Admiralty. The whole cost of the Department does not exceed two lakhs of rupees or 20,000*l*. per annum.*

The first general report on the operations of the Marine Survey of India was issued by the Superintendent, Commander Taylor, in the latter part of December 1876. It commences with a retrospect of the preliminary steps from 1871 to 1873 which led to the deputation of Commander Taylor to India in the latter year. It touches upon the proposals of the Government of India for securing efficient surveys and charts, the measures taken in England to obtain qualified surveyors, and the final departure of Commander Taylor and the officers selected for service under him in December 1874.

The vessels chosen for the Marine Survey operations were at that date as follows:

The 'Clyde' (steamer) and the 'Constance' (schooner) had been fitted at Bombay for surveying purposes, and the 'Guide' (brig) and the 'Lady Lawrence' (schooner) had been selected by the Kidderpore dockyard authorities for the same service. The last-mentioned vessel, however, could not carry a steam-cutter, and was unsuitable for chart work, so was retransferred to the Marine Department. The 'Clyde' eventually proved to be almost useless under sail, and the 'Guide' to be so affected by dry rot as to be unseaworthy and not worth repairing. These disappointments have caused much delay, and have necessitated the provision of a new steamer, which is eventually to be constructed in England.†

Notwithstanding the lack of vessels, the Department has been able to accomplish much valuable work. Mr. Chapman, late I.N., in the 'Constance,' made a plan of Kolachul Harbour and surveyed the Enciam Rocks in Travancore, charting 6 miles of coast and 5½ square miles of water. He then rounded Cape Comorin, passed through the Paumben Pass, obtained additional soundings in Palk Strait, and verified those on the published charts, and then proceeded to Coconada, where he commenced the survey of the Bay, till relieved by Lieut. Hammond and Sub-Lieut. Petley. This survey was completed on the 24th August. It comprised 79 square miles of water and 42 miles of coast, charted on a scale of 2 inches = 1 nautical mile. The survey has since been republished by the Admiralty Hydrographer. Regarding the question of the lighting of the port of Coconada, Lieut. Hammond considers that two new lighthouses are required; one of the first order dioptric, with a radius of 21 miles, on Point Gordeware, and another for Coconada Harbour of the third order dioptric, to show at a distance of 10 miles, and to be erected 4½ miles S.S.E. of the present lighthouse.

On the 8th April the 'Guide,' under the command of Navigating Lieut. J. E. Coghlan, proceeded down the River Hooghly, and surveyed the dangerous James and Mary Shoals, Luff Point to Anchoring Creek, including the entrance to the Roopnarain River, on the scale of 10 inches to the nautical mile (this being subsequently reduced for publication by photozincography to 6 inches to the mile). The chart is a valuable one for record, and Captain Taylor remarks that if the whole of the river from Chandernagore were annually surveyed in the same way, a comparison of the results would be most invaluable in carrying out engineering works for the improvement of the conservancy of the river.

Staff-Commander Ellis, R.N., in the 'Clyde,' had in February connected by meridian distance Pigeon Island with one of the Laccadive group, in his voyage from Bombay to Calcutta. He was also enabled to make an examination of the channel into Mootapetta Bay (Port Lorne), the soundings near which differed considerably from Captain Powell's survey in 1837. The dredging and blasting operations in Paumben Pass are still continued. A depth of 11 feet 9 inches had then (March 1875) been attained, and it was confidently expected that the Pass would soon be available for vessels of 14 feet draught.

Survey operations along the Burma coast were commenced in November 1875, by Lieut. Jarrad, in the 'Clyde,' examining the approaches to the Rangoon River. The erection and maintenance of a tide-pole was a matter of great difficulty, owing to native boats fouling it, and the great strength of the tidal streams. Commander Taylor considers the establishment of a self-registering tidal gauge there very desirable. This important survey was completed on the 8th March, and comprised 37½ miles of coast, trigonometrically laid down, and 216 square miles of water examined. In consequence of a discrepancy in longitude discovered in the compilation of the sheet, including the coast of Tenasserim and Singapore and Penang, the meridian distance between Elephant Point Obelisk, which has been determined by the Great Trigonometrical Survey, and Amherst, was astronomically measured. The result proved that the position of Amherst on Admiralty Chart No. 823 is 4½ miles too far west. Commander Taylor intends to have observations made next season at Diamond Island, off Cape Negrais, and Amherst, for the same purpose, and there would then be three principal points in the Gulf of Martaban fixed astronomically. These measurements of meridian distances are of great importance, as the whole of the eastern side of the Bay of Bengal has been very incorrectly laid down on the Admiralty Charts, an error of from 5 to 8 miles sometimes existing.

---

* The Department consists of the following officers:—Commander A. D. Taylor, I.N., Superintendent; Staff-Commander J. H. Ellis, R.N., Deputy Superintendent, 1st Grade; R. C. Carrington, Esquire, Superintendent of the Drawing Branch; Navigating Lieutenant F. W. Jarrad, Deputy Superintendent, 2nd Grade; Navigating Lieutenant G. C. Hammond, R.N. (one vacancy), Assistant Superintendents, 1st Grade; Navigating Lieutenant E. W. Petley, R.N., Mr. M. Chapman, Lieutenant W. H. Coombs, R.N. and Navigating Lieutenant T. C. Pascoe, R.N., Assistant Superintendents, 2nd Grade; Mr. P. J. Falle (one vacancy), Assistant Superintendents, 3rd Grade; and Dr. J. Armstrong, B.A., Surgeon and Naturalist.

† The Asiatic Society of Bengal have requested Government to have this vessel constructed with appliances for deep-sea dredging. This request is now under consideration.

After obtaining some prolific dredging between Diamond Island and Akyab, the 'Clyde' commenced the survey of that port on the 21st March. Much time was spent in clearing the hill-tops of jungle, owing to the independent character of the Burmese, and the difficulty, through want of an interpreter, of communicating with them. On the night of the 30th March, Navigating Sub-Lieut. C. George, R.N., was suddenly seized with cholera, which had been rife for some time among the native population; and though everything possible was done to arrest the progress of the disease, the unfortunate young officer died at noon on the 1st April. Lieut. George was a son of Staff-Commander C. George, R.N., Map Curator to the Royal Geographical Society, and a young officer of much promise. Owing to the threatening prevalence of the disease, Commander Taylor, who was on his way down the coast of Burma on a visit of inspection, ordered Lieut. Jarrad to leave Akyab. The 'Clyde' accordingly proceeded northwards, and tested the correctness of the coast between Cheduba, and Kyouk Phyou, as shown on Admiralty Chart No. 821. Lieut. Jarrad reports it to be roughly laid down and out of bearing when referred to Cheduba Island. The published plan of Kyouk Phyou proved to be so incorrect that arrangements were made for the survey of the port to be continued the ensuing season.

The 'Constance,' under the command of Lieut. Hammond, left Calcutta in December 1875 for the purpose of making a plan of the anchorage of False Point on the Orissa coast. In spite of many mishaps with the steam-cutter, the survey was completed by the 9th March. The anchorage was charted on the 6-inch scale, the coast for 5 miles to the south and 10 miles to the north was surveyed on the 3-inch scale, and the soundings extend to from 5 to 8 miles off shore. Lieut. Hammond then proceeded to the northern portion of the shoal off Dhumrah River, where he measured a base, and proceeded to sound the shoals. Unfortunately, work was completely stopped by a heavy gale, and a great number of the crew falling sick compelled Lieut. Hammond to return to Calcutta, whence he proceeded to England on medical certificate.

During the months of April and May 1876, Commander Taylor made a tour along the eastern coast of the Bay of Bengal, and inspected the ports of British Burma. He visited first Akyab and Moulmain, and then proceeded to Amherst. This port has never been properly surveyed. The late Mr. Pearson, of the Bengal Marine, examined the Moulmain River in 1865, but no steps were taken to have the Admiralty Chart corrected by the survey. Commander Taylor is of opinion that no large port of British India requires so much to be properly surveyed and mapped, and has accordingly arranged for Lieut. Jarrad to commence next season's work at Amherst. The Admiralty Chart of Tavoy proved to be dangerously erroneous; and the British India Steam Navigation Company's steamer 'Mahratta,' when navigating by it, struck on a rock in Tavoy River. Subsequently, Captain Taylor discovered a copy of the survey of Tavoy, executed by Lieut. R. Moresby, of the Bombay Marine, in 1824, and published by Horsburgh in 1827, which is far superior to that issued by the Admiralty. Captain Taylor proposes to issue amended charts of Tavoy, Mergui, Pakchan, &c. After visiting Mergui he turned his attention to the passage from Mergui to Pakchan, which urgently needs sailing directions—none of which at present exist. He proposes to issue these in the form of hydrographic notices, explanatory of the normal trading route between Moulmain and Pakchan, touching at Tavoy and Mergui, with some useful remarks on the extended voyage along the Siam coast to Penang. Below Pakchan, Commander Taylor has made a sketch showing the soundings in the entrances to Kopah, which has great tin mines like most of the ports along the Siam coast, but no trace of such a fine river as depicted on the Admiralty Chart. A new chart of Kopah is now in preparation. Of Junk Ceylon or Salang a pretty good survey was obtained from Captain Richelieu, commanding the Siamese Royal gunboat 'Coronation.' This officer was trained in the British Royal Navy, is a good observer, and most intelligent in surveying the coast and islands. The actual survey of this island differs immensely from the published one, and the corrected charts will be a great boon to the British Indian Steam Navigation Company and the coasting trade.

The Superintendent of Marine Surveys has been consulted by Government on a variety of marine questions of great importance. Among these may be mentioned that of the reorganisation of the River Hooghly Survey, on which an exhaustive report has been submitted by him. Commander Taylor is of opinion that an elaborate scientific survey of the whole tidal basin of the Hooghly River, at least from Chandernagore to the Sand Heads is required, as well as an accurate series of levels from Calcutta to below Diamond Harbour.

During the year under review a valuable list of lighthouses and light vessels in British India, including the Red Sea and coast of Arabia, has been issued by the Marine Survey Department. The list is in the form of a handbook, giving in tabular order the lights, with their names, latitude and longitude, colour, radius of illumination, height, and other particulars. This little book will be a most useful aid to navigation. It has been compiled by Mr. R. C. Carrington.

The programme of work to be undertaken by the Marine Survey Department during the season of 1876-77 was as follows: The 'Clyde' was to leave Calcutta in November, call at Diamond Island (Bassein River), and connect the same astronomically with Rangoon and Amherst Pagoda, and then proceed to survey the approaches and entrance to Moulmain River, on a 2½-inch scale. After that the 'Clyde' was to examine the entrance to the Sandoway River, and then to complete the survey of Akyab Port—a task which will probably occupy two months.

Commander Taylor proposes himself to visit first the Mergui Archipelago, in which trip he is to be accompanied by Dr. Armstrong (the opportunities for research in natural history and geology being very promising in these islands), and then to inspect all the ports on the Coromandel Coast, with a view to satisfying himself regarding their requirements as far as regards lighting, buoying, &c. This programme has received the sanction of the Government of India.

Reviews.

THE VATNA JÖKULL.*

For one thousand years, since Iceland was first colonised, the region of the Vatna or Klofa Jökull remained unexplored. This vast tract of ice and snow, exceeding in extent 3000 square miles, appears to us to have this peculiar interest, that it is a key wherewith to unlock the unexplored and unexplorable interior of Greenland. We find the Vatna Jökull to be a plateau (all valleys being filled up with ice) which receives yearly vastly more snow than is wasted by melting or evaporation; its level is probably rising, and it is certain that the icy formation is continually extending outwards. This was shown as long ago as 1814 by Henderson, and Mr. Watts gives positive proof of this extension both to the north and south, although the Icelanders are unwilling to admit it. Such a vast mass of ice affects the climate in its vicinity, and thus by its power of refrigeration helps its own growth. The best opinion is that the interior of Greenland is one vast glacier, and observation shows that the ice of the interior is encroaching on the coast. We may very well judge what that interior is from Mr. Watts's description of the plateau of the Vatna Jökull. The few attempts that have been made to penetrate inwards from the coasts of Greenland confirm this view.

> "The Vatna Jökull comprises by far the most important mountain section in Iceland, and a far greater area is covered by its snows than could be occupied by the sum of all the remaining snow-clad mountains in Iceland. As may be supposed, perhaps half the river-water of Iceland flows either directly or indirectly from the Vatna Jökull, either issuing in torrents from the extremity of its glaciers, or, after filtering for long distances through the loose and cavernous ground, appearing as land-springs at a lower elevation."

This mysterious region has hitherto been guarded from invasion by the terrors of the elements, and the spells cast around it by Icelandic legend and superstition. Mr. Watts has been the first to face the fury of the horrible gales which sweep over its icy surface, and to encounter the wind "Trolls" howling and shrieking in the storm, with whom old Icelandic story peoples a district "destitute alike of animal, insect, and floral life."

An old Icelandic traveller, he had in the preceding year made arrangements for his expedition, and engaged a party of five Icelanders to accompany him. His equipment much resembled that for a Polar sledging expedition, except that Mr. Watts prefers for a prolonged sojourn in wet snow a large sleeping bag 8 feet long and 5 feet wide, open at both ends, for three to sleep with their heads one way, and three with their heads the other. The course selected for the passage of the Vatna by our traveller lies to the west of the plateau, about 17° 20′ W. longitude, starting a little to the west, and emerging somewhat to the east of this line. He started at the end of June and spent twelve days on the snows of the Jökull; for a third part of this time progress was absolutely impossible, from the frightful storms which raged over this elevated region. Every variety of bad weather was experienced, fog, rain, sleet, snow, and wind; in this short time snow fell in such abundance, that in one night the tent was buried several feet by morning. The lowest temperature registered was +13°, the reader will remember that this was at the period of the longest days. The softness of the snow made travelling very exhausting, and even in these twelve days two of the men suffered in health, one from spitting blood, the other from severe pains in the stomach. It is clear from the difficulties encountered in this expedition, that any attempt to penetrate into the interior of Greenland to any real distance is utterly hopeless.

We have confined ourselves to the Vatna and the passage across it; but we promise our readers much interest in the rest of this gallant traveller's adventures in Iceland, his explorations in the district which lies between the Vatna and the Lake of Myvatu, and his return journey across the island by the Sprengisandr; as well as in his observations on the sulphur mines, and the climate and geology of Iceland. He gives us an uncomfortable hint that the Gulf Stream is being gradually deflected in a southerly direction, and so a glacial epoch is gradually creeping downwards!

Mr. Watts deserves credit for compressing into 200 pages matter which many travellers would think entitled them to a couple of volumes.

CURRENT-CREATING ACTION OF VIS-INERTIÆ IN THE OCEAN.*

Mr. Jordan, in the present small volume, points out to what extent recent oceanic explorations have confirmed the theory of the current-creating action of *vis-inertiæ* in the ocean, which he explained ten years ago.

> "The theory of *vis-inertiæ* shows that that force is universal gravitation. The water of the ocean tends to maintain its state of rest in the position in which the gravitation of the universe tends to hold it. And as the property of *vis-inertiæ* inherent in any given particle of matter is the combined action of the gravitation of every other particle of matter; therefore, when the earth moves, there is caused a conflicting action of different forces of gravitation in the ocean. Whilst terrestrial gravitation carries the ocean along with the earth, all other forces of gravitation (to which the term *astral* gravitation has been applied) tend to keep it in its former position.
>
> "Under this conflicting action, the particles of the ocean least firmly held by the force of terrestrial gravitation—which are those about the surface of the deep and central parts of the ocean—tend to flow in the opposite direction to that of the earth's motion; whilst counter-currents tend to flow along the shores and bottom of the ocean, where the relative action of astral, as compared with terrestrial, gravitation is less."

In the year 1866 Mr. Jordan published a chart showing the action of *vis-inertiæ* as regards currents; and his present publication is intended to show the extent to which recent researches in the depths of the ocean have tended to confirm this view, as distinguished from Dr. Carpenter's theory that the circulation of currents is caused by differences of temperature, according to which the cold water must be below the warm water all the way to the Arctic Regions.

---

* *Across the Vatna Jökull; or, Scenes in Iceland;* being a description of hitherto unknown regions. By William Lord Watts. London (Longmans & Co.), 1876.

* *Remarks on the recent Oceanic Explorations, and the Current-creating Action of Vis-inertiæ in the Ocean*, by William Leighton Jordan, F R.G.S. (Hardwicke, 1877), pp. 47, with chart and diagrams.

For Dr. Carpenter's view is that the warm water flows along the surface of the ocean to those regions, and *because* it gets chilled there it sinks down to return southwards as an under-current. But the theory of *vis-inertiæ,* according to Mr. Jordan, makes the water sink downwards in the temperate regions; and a part of the water which comes along the surface of the ocean from the equator to the temperate regions, then sinks downwards and flows along the bottom of the ocean to the Arctic Regions whilst in some places cold water flows southwards above it.

It will be remembered that when Mr. Leigh Smith made his voyage to Spitzbergen in the 'Samson,' in 1871, he took soundings in 81° 24′ N., finding the water at the surface at a temperature of 33°, while at 300 fathoms it was 42°. The same fact was observed by Captain Scoresby in 78° N. He found the surface 32° and the water at a depth of 760 fathoms 38°. In 1872 Leigh Smith obtained a similar result. In 80° 17′ N., he found the temperature of the water gradually increasing to 64° at a depth af 600 fathoms. These observations exactly coincide with the pre-asserted action of *vis-inertiæ*, and are as exactly at variance with the temperature theory.

In his chart of the Arctic regions, published in 1866, Mr. Jordan showed a circulation eastwards all round the shores of the Arctic basin, but that also the bottom-water is forced upwards to the surface along the shores of the eastern hemisphere, and from that coast it sets across the ocean to the shores of the western hemisphere. The existence of such a surface-pressure from the eastern to the western hemisphere is corroborated by the constant packing of the ice against the latter coast. Sir George Nares found the ice, which was slowly moving eastwards, being at the same time constantly packed against the coast by pressure from the north.

Mr. Jordan further says that the evidence from all Arctic expeditions goes to show that ice-floes are being constantly torn away from the shores of the eastern, and packed against those of the western hemisphere. But for this surface-pressure from one coast against the other coast, those ice-floes would continue to be ice-floes, instead of being piled up into the formation of floe-bergs. The Polar pack is not formed in narrow channels, but in the wide expanse of the Polar Sea. It is not in narrow channels, nor even on shores which appear to be those of narrow seas, but on shores which the evidence all indicates to be the shores of a wide oceanic area; it is in that Polar Ocean, or Palæocrystic Sea, that the floe-bergs are formed and packed against the coast.

Mr. Jordan then refers to recent corroborative evidence in favour of the *vis-inertiæ* theory as regards the temperate and equatorial regions of the ocean, and thus concludes:—"The distinct manner in which the current-creating action of the earth's rotation has been confirmed by facts brought to light since the publication of the theory of *vis-inertiæ*, must be regarded as strong, though indirect, confirmation of the indications of the existence of a current-creating action of the earth's onward motion through space."

Ostriches and Ostrich Farming. By *Julius de Mosenthal* and *James Edmund Harting*. With Illustrations. (Trübner, 1877.)

This is an interesting little monograph on the *Ratitæ*, struthious, or ostrich-like birds, and the portion of the book which has interest for us is that which discusses their geographical distribution.

The *Struthio camelus*, or African Ostrich, has the largest range, being met with in North and South Africa, Syria, Arabia, and Mesapotamia, while its fossil remains were found in the Sewalik Hills. It is mentioned twelve times in the Bible, in some passages the word being rendered "owl" in our version, by Strabo and Herodotus, and in the anabasis of Xenophon. Wellsted mentions the ostrich as being seen on the route between Hit and Damascus; Palgrave says it is not uncommon in the Hedjaz. But ostriches are certainly becoming rarer and rarer in Asia, and they are now extinct on the route to Suez, where Burckhardt saw them in 1816. They are, however, common in the Somali country, and Cameron speaks of them in Ugogo and Unyanyembe. Ostriches will run at a rate of twenty-six miles an hour, their stride being from twenty-two to twenty-eight feet, and Dr. Haughton has given a most interesting account of the muscular mechanism of the ostrich's leg.* In Morocco the Arabs dash after the ostriches on horses at full speed; in Arabia the bird is stalked and killed while sitting.

In 1834 the quantity of ostrich feathers exported from South Africa was 38,216 lbs., worth 519,540*l.* The best feathers of all, but they are very rare, come from the Syrian desert. The value of the ostrich feathers exported from Egypt is 250,000*l.*, from Barbary 100,000*l.*, Mogadore 20,000*l.*, and Senegal 300*l.*

The *Rhea* is the American ostrich, having the head and neck feathered, no tail, and three instead of two toes. There are three species, the *Rhea Americana,* ranging from the Straits of Magellan, all over Patagonia, to Paraguay, and South Brazil; the *Rhea Darwini*, of Southern Patagonia; and the *Rhea Macrorhynchus*, described by Dr. Sclater, the habitat of which is doubtful. The chase of the ostrich in Patagonia is admirably described by Captain Musters; and this chase is a most remarkable instance of the rapidity with which a complete change may be made in the habits and methods of a whole race. When Magellan's fleet was on the coast of Patagonia, Pigafetta tells us that the natives were accustomed to stalk the ostriches, approaching them covered with ostrich skins and feathers, and using bows and flint-headed arrows. Soon afterwards horses were landed in the Rio de la Plata, and very few years had elapsed before the Patagonians had entirely changed their habits and mode of life—were all mounted, and, instead of stalking, ran the ostriches down, and caught them by hurling *bolas* or lassoes. In 1874 sixty tons of ostrich feathers were exported from the Argentine ports, worth $132,689. Several experiments have been made in rearing American ostriches in Europe, under the auspices of the Société d'Acclimatation.

Mr. Harting also gives an account of the various species of Australian cassowary, which has three toes, the head bare with a horny helmet, neck bare and bright coloured, and neck with wattles; and of the emus, which have feathered heads and no helmet; as well as of the kiwi or apteryx.

The second part of this interesting little book is devoted to an account of the system of ostrich farming in South Africa, by M. Mosenthal. In 1865 there were only eighty tame ostriches in Cape Colony, while in 1875 there were 32,247; a convincing proof that ostrich farming is not an unprofitable speculation. The requirements are free space and good fences, 600 acres being required for eighty birds. There are ninety to one hundred feathers to a pound, and a full-grown male will yield a pound, worth from 42*l.* to 50*l.* at Cape Town. Second class feathers are worth 20*l.* to 30*l.*

---

* *Proceedings of the Royal Irish Academy*, ix., p. 50.

THE LACCADIVES AND THE WEST COAST. Article by *A. O. Hume, Esq., C.B.*, in the number of "Stray Feathers" for January 1877.

"STRAY FEATHERS," the Ornithological Journal in India, edited by Mr. A. O. Hume, C.B., the Secretary to Government in the Department of Revenue and Agriculture, as a rule, contains matter which is strictly ornithological; but the various branches of science often dovetail and supplement each other, and the January number of "Stray Feathers" has some geographical notes of much interest. In February 1875, Mr. Hume visited the Laccadive Islands in the 'Clyde,' an old gun-boat that had been fitted out for the use of the Indian Marine Survey Department.

Mr. Hume's main *geographical* object in his tour to the Laccadives was to ascertain whether this group was separated from India by a deep trough; but his paper also contains an account of the islands, and of their population, as well as an exhaustive descriptive enumeration of their *avifauna*. The cruise of the 'Clyde,' on this occasion, established that the Laccadives are divided from the mainland of India by a deep trough not less than 1300 fathoms in depth, and possibly considerably more; that they have no distinctive fauna or flora, no mammals except the common Indian *mus rufescens*; no land-birds except a very few of the commonest Indian species, and no non-Indian plants. Mr. Hume observes that the majority of the species of plants possess, according to native ideas, medicinal properties, and are therefore just those which are most likely to have been introduced by human agencies. He sees ground for suspecting that the northern members of the group have undergone a period of subsidence since the coral, of which they mainly consist, was formed, the subsequent elevation not having been sufficient to allow the re-emergence of those islands now represented by the great banks of Padrio, &c. He adds, "Probably the subsidence was greatest to the north, and not improbably it was connected with the volcanic agency which we know to have been in operation scarcely more then half a century ago in the Runn of Cutch, which is due north of the Laccadives."

NOUVEAU DICTIONNAIRE DE GEOGRAPHIE UNIVERSELLE. Par *Vivien de St. Martin.* 1re fascicule. (Paris, Hachette, 1877.)

SIMULTANEOUSLY with their new atlas, Messrs. Hachette are bringing out a gazetteer of the world, to be published in about forty bi-monthly parts of eighty folio pages. The author has spent no less than sixteen years in the collection of materials for this elaborate work. He has aimed at producing a trustworthy book of reference, and, as far as we are able to judge from a perusal of about fifty articles, he has succeeded. The physical geography of the various countries is treated with much detail, and special attention has been paid to ethnological subjects, which most of our gazetteers, confining themselves as they do to the names of localities or districts, neglect almost altogether. It is only natural that France and French Colonies should occupy a prominent position in a work principally written for French readers, but other countries are not neglected on this account. Thus, on the first few pages, we meet with the following articles referring to the British Isles:—Abbey, Abbots Bromley, Abbotsbury, Abbotsford, Abbots Hall, Abbots Langley, Abbs Head, Abdie, Aber, Aberaeron, Aberavon, Aberbrothock, &c. The Gazetteer is evidently the result of serious labour, and we hope its aged author may be granted health to complete it.

Cartography.

OFFICIAL EUROPEAN CARTOGRAPHY IN 1875-76.—In the following lines we propose to notice the principal publications of the Continental Topographical Departments, as far as they have become known to us:—

GERMANY, though united now under an emperor, cannot yet boast of a Topographical Office, extending over the whole of the Empire, and the various states continue the publication of their maps as they did before, there being neither uniformity of scale nor of system.

In PRUSSIA some progress has been made with the new edition of the map of the eastern half of the kingdom, as well as with its western continuation on the same scale. Eight sheets of the former and seven of the latter were published in 1875 and 1876.[*] The maps are neatly engraved on copper, and leave nothing to be desired as regards clearness and technical execution. They are utilised in the production of District Maps (Kreiskarten), many of which have been issued since 1875. The publication of the plane-table sections (Messtischblaetter) on a scale of 1:25,000 is proceeding rapidly. No less than 281 sheets of the Map of Prussia and the Thuringian States have been issued. A similar Map of Nassau, in fifty-two sheets, is in progress of publication. It is based upon surveys made in 1867-68, and revised to date. Eighteen sheets, out of a total of fifty-two, have already been issued. The general staff has likewise published a map of the environs of Kiel,[†] and has in hand a map of the environs of Berlin in fifty sheets.

The Geological Survey, carried on by order of the Board of Trade, is based upon the plane-table sections, of which forty-nine sheets have already been published, coloured geologically, and accompanied by explanatory memoirs and sections.[‡] The first part of this survey was published in 1870, and unless its progress is accelerated, none of us will live to see it completed.

SAXONY has always occupied a prominent position with respect to its topographical maps, and the publication of its new topographical map will ensure it that rank for the future likewise. The map on a scale of 1:1000,000 having been completed in 1873,[§] a new survey was at once begun, and in the course of 1875 and 1876 no less than twenty-three sheets of it were published.[‖] This new map has a scale of 1:25,000; the ground is delineated by contours. There are again two editions, the one in outline, the other with the hills shaded in chalk, a most efficient and expeditious method of showing the features of the ground.

Preparations for a geological survey of Saxony, the conduct of which has been entrusted to Professor Credner, have been in progress since 1873, and the maps will be published on the same scale as the new survey.

The Topographical Atlas of BAVARIA (1:50,000, 112 sheets) was completed in 1868, and a new edition of it has been in progress since 1870. The hills on the new maps are shown much more satisfactorily than on some of the older sheets which date as far back as 1812.

---

[*] Topographische Karte des preussischen Staats, östlicher Theil, 1:100,000, 319 sheets. New edition since 1862. Sheets 1-10, 13-19, 26-32, 41-49, 62-70, 84, 86-90, 104-106, 108-110, 120, 124-128, 144-146, 167, 184, 304, 305, and 312 have been published.

The same, western portion. Sheets 258 F, 273 E and F, 287 E and D, 299 H, D and F, 310 E and D, 312 A, and 316 E, have been published.

[†] Karte der Umgegend von Kiel, 1:125,000. 4 sheets. Berlin, 1875.

[‡] Geologische Karte von Preussen u. den Thüringischen Staaten, 1:25,000. Part 6 was issued in 1875, Part 7 in 1876.

[§] The map consists of 28 sheets, and two editions were published of it, one in outline, the other with the hills engraved.

[‖] Topograpische Karte von Sachsen. 156 sheets. Published 45, 46, 59-63, 75-79, 94-98, 111-116, and an Index sheet. Price 1s. a sheet, or 2s. with the hills shaded.

The Bavarian General Staff is likewise publishing a photo-lithographed edition of 920 plane-table sections, on a scale of 1:25,000. Eighteen of these were issued in 1875.

In WURTEMBERG a new edition of the Topographical Map (1:50,000) is in progress of publication.

The Board of Works of HAMBURG has published most carefully-executed maps of the city and its territories, with contours laid down upon them at intervals of 5 feet.[*] Of more general interest is a map of the environs of Hamburg, on a scale of 1:50,000, published within the last few days by the same Board, and embracing a portion of Southern Holstein. Brown contours at intervals of a metre indicate the height above the sea, blue contours the depth below it.

In AUSTRIA the new topographical map of the whole of the Empire has been fairly started. It is to consist of 715 sheets, each 15 min. of latitude in height, and 30 min. of longitude in width. The scale is 1:75,000, and the map is produced by the heliographic process, which consists in transferring the original drawing upon copper, and producing an engraved plate by etching. Though only begun in 1874, no less than 151 sheets of this map have already been published, the drawing of forty-nine others has been finished, and sixty-eight were still in the draughtsmen's hands at the close of 1876. The published sheets embrace the whole of the Tyrol, Austria Proper, Salzburg, Transylvania, and the Bukowina, with parts of Galicia and Hungary. The survey, on a scale of 1:25,000, is carried on by sixteen detachments, and progresses at the rate of 2100 square miles annually. The map may, therefore, be completed in about eight years.

The special map of Hungary[†] is likewise making rapid progress, no less than twenty-one sheets having been published within the last two years. Two maps of the environs of Vienna are in progress of publication, one on a scale of 1:12,500 in 160 sheets, the other on a scale of 1:25,000. Of this latter six specimen sheets were published in 1876. The hills are shown by contours at intervals of 10 metres and in chalk, the roads are printed in red, the forests tinted a delicate green, and the outline and writing are in black. Of the other map of Vienna, thirty-two sheets were published and twenty-four were in the hands of the lithographers at the close of 1876.

A map of the environs of Salzburg (1:32,000) has been produced by photo-lithography, from the original plane-table sections.

The Military Institute has likewise prepared a military route map of the monarchy, in fifty sheets, carefully revised by the local authorities.[‡] Two sheets of this map appeared in 1874, thirty-six sheets were published in the course of the two succeeding years, and it is expected that the whole of it will be completed in spring. An official Postal and Railway Map has likewise been published in the course of last year.[§]

The geological survey of the Monarchy is being carried on by four detachments under the direction of Dr. G. Stache, V. Mojsisovies, H. Wolf, and C. Paul. The latter has published a geological map of the Bukowina (Vienna, 1876), whilst the two detachments at work in the Tyrol and the neighbouring parts of Italy have inserted the geological features upon four sheets of the new map of the Empire.

The Geological Institute of Hungary has published maps of the environs of Tata, Nagy Vaszony, Sarvar, Sumeg, and Stuhlweissenburg, and a reduced edition of Hauer's well-known geological map has likewise been issued.[*]

The administrative map of Lower Austria, published by a private association numbering 1239 members, and accompanied by valuable statistical and topographical memoirs, is rapidly approaching completion, eighty-five out of a total of 111 sheets having been published up to the beginning of this year. The "Society for the Exploration (Landesdurchforschung) of Bohemia," is likewise continuing its useful publications. Amongst the maps recently published are a hypsometrical map of the Giant Mountains (1:100,000) and Sheet III. of the Hypsometrical Map of Bohemia (1:200,000), both by Dr. C. Koritzka.

SWITZERLAND is determined not to rest content with the laurels won by the publication of Dufour's large map, but continues the publication of a Topographical Atlas in 546 sheets, on a scale of 1:25,000 for the cultivated districts, and of 1:50,000 for barren mountain regions. Nine parts of this valuable work have been published up to the present time, containing altogether 112 sheets. Dufour's four-sheet map, on a scale of 1:250,000, has been utilized in the production of a military district and of a railway map.[†] Ziegler's fine map of the Engadin and Bernina (1:50,000) has already been noticed by us. It is accompanied by a memoir on the corelation between geology and topography. Nor will we allow this opportunity to escape us for again drawing attention to the fine map of Switzerland published by the Alpine Club in 1875.

The Geological Survey of Switzerland is carried on by a Committee of the Swiss Natural History Society, who receive for that purpose a small government grant, sufficient merely to cover the travelling expenses of their surveyors. Sheet 9 (St. Gall, Appenzell, &c.), by Gutzwiller, Mösch and Kaufmann, and sheet 24 (Ticino), by E. Spreafico, Negri and Stoppani, have been issued recently. Sheets 12, 13, 18, and 19 are in hand; whilst sheets, 4, 14, 17, and 23 have not yet been begun.

The Topographical Bureau of the NETHERLANDS has completed a new edition of the Topographical Map (1:50,000), as well as of the Topographical Atlas on a scale of 1:200,000.[‡]

The Hydrographical Map of the Netherlands (Waterstaatskaart) appears to make but little progress, only six sheets having been published in the course of 1876.

The Topographical Map of BELGIUM (1:40,000, in 75 sheets) has been in progress of publication since 1863, and about forty-six sheets have already been published, whilst the surveys for the remainder have been completed. The hills are shown by contours at intervals of 5 metres. Of the plane-table sections[§] no less than 300 have been completed. These maps are printed in colours, and have contours at intervals of a metre. A road map of Belgium, recently published by the Depôt de la Guerre, supplies more information than its title promises,[||] for it shows forests and meadows, and contours at intervals of 20 metres have been inserted upon it.

No progress has been made with the Topographical Map of DENMARK on a scale of 1:80,000. The twenty-nine sheets published up to 1873 delineate the whole of

---

[*] Plan von Hamburg and Umgebung, 1:4,000. 4 sheets.
Plan von Hamburg, 1:1,000. 15 sheets.
Vogtei Karten, 1:4,000. Thirteen Vogteien in 19 sheets.

[†] Specialkarte von Ungarn, 1:144,000. 198 sheets.

[‡] Militärmarschroutenkarte der öster.-ung. Monarchie. Vienna, since 1874.

[§] Post und Eisenbahnkarte der öster.-ung. Monarchie, herausg. vom Post Cours Bureau. 86 sheets. Vienna, 1876.

---

[*] Hauer, Geolog. Karte von Oesterreich-Ungarno. Folio. Vienna, 1875.

[†] Karte der Militärkreise der Schweiz. Bern (Dalp), 1876. Officielle Eisenbahnkarte der Schweiz. Bern, 1876.

[‡] Topographische Atlas van het Koningrijk der Nederlanden, Vervaardigd op het topograpisch bureau van het departement van oorlog. 20 sheets. The Hague, 1876 (first edition published in 1871).

[§] Carte de Belgique ou réproduction de planchettes minutes. 1:20,000, 437 sheets. Brussels since 1866.

[||] Carte routière de Belgique. 1:160,000. 4 sheets. Brussels, 1875.

the islands, and it appears to be the intention to discontinue the publication of this map, for the new map of Jutland[*] is being published on double the old scale. The contours, as on the old map, are drawn at intervals of 10 feet, and there is no hill-shading to facilitate the reading of the map. The engraving is perhaps a trifle too delicate.

In SWEDEN a Topographical Map, on a scale of 1:100,000 is being published since 1866. It will consist of 102 sheets, at which forty-six have now been published. The progress made recently is very slow, for only five sheets have been published during the two years under notice. The publication of the District or Län Maps, scale 1:200,000, was stopped in 1872, after eleven läns in fifteen sheets had been published. The Agricultural and Industrial Survey of Sweden (Rikets ekonomiska kartverk) is in progress since 1859, and the whole of Central Sweden, as well as a large portion of Norbothnia, has been surveyed on a scale of 1:20,000, but as the maps are only published on the local authorities undertaking to pay the cost of lithographing them, only a portion of this work is available for public use. A general map of Sweden[†] is being engraved. The first sheet was published in 1870, and a second sheet is nearly ready for publication.

The Geological Survey of Sweden, under the direction of O. Torrell, E. Erdmann, and others, has resulted hitherto in the publication of sixty-two maps on a scale of 1:50,000, and of four maps on a scale of 1:200,000, accompanied by memoirs and sections.

The Topographical Map of NORWAY[‡] is progressing slowly, only two sections having been published in 1875 and 1876. The map is printed in colours. The hills, where inaccessible, are drawn in chalk, whilst in the cultivated parts of the country they are shaded on Lehmann's system. Professor Th. Kjerulf has published a work on the geology of the Trondhjem Stift, with a map on a scale of 1:800,000.[§]

The RUSSIAN Topographical Department is engaged at present upon a new edition of the map of Poland (1:126,000, 54 sheets), with Russian nomenclature, and upon Colonel Strelbitzky's map of European Russia in 152 sheets (1:420,000), of which ninety-six have been published since 1867. Of the latter two editions are being issued, the one in black, the other printed in four colours.

(To be continued.)

VIVIEN DE ST. MARTIN'S ATLAS UNIVERSELLE.[||]—Messrs. Hachette, the publishers of this work, deserve credit for having enabled M. Vivien de St. Martin, and the draughtsmen and engravers associated with him, to produce an Atlas which may fairly take rank amongst the very best works of this kind in existence. In an introductory notice to the first part of this publication M. Vivien traces the history of cartography since the days of Ortelius and Mercator. He dwells proudly upon the great services rendered by Delisle and Danville, and deplores that France should have fallen so far below what her sons achieved in former ages. He is indignant, and justly so, at the wretched maps which latterly found their way into public institutions and schools, the mere products of mercantile enterprise, directed by the lowest of motives. The Atlas now in course of publication is to regain for France the place amongst nations which she held formerly, and if we may judge from the maps now issued and of others of which we have seen proofs, this result will be achieved. The French public will now be presented, for the first time since the middle of the eighteenth century, with a set of maps embodying the results of geographical research, and creditable as work of art, to the skill and tastes of the artists employed upon it. The Atlas will consist of 112 plates, 24 by 20 inches in size. Three plates will be devoted to astronomical geography, two to physical geography, one plate to ethnography, seventy-seven plates to general and twenty-nine to historical geography. Each map will be accompanied by a memoir describing the authorities upon which it is based, and if these memoirs are written as carefully as that referring to the map of the Balkan Peninsula, they will in themselves constitute a work of no small value. The Atlas is to be published in parts containing three maps each. Only three parts are to appear annually, and twelve years must therefore pass over our heads before the work is completed. We hope the publishers will find means to accelerate this slow rate of progress.

E. G. RAVENSTEIN.

Log Book.

—:o:—

Mr. Stanley's visit to the Lukuga outlet of Tanganyika.—The *Daily Telegraph* publishes a letter from Mr. Stanley, dated Ujiji, August 7th, 1876. He appears to have arrived there in the previous June, and to have made a cruise round Lake Tanganyika during July, visiting the Lukuga outlet discovered by Commander Cameron, and examining the portion of the north-west coast of the lake hitherto unexplored. He reports that Ubwari, in the north part of the lake, is not an island but a peninsula, forming a deep bay, which he has named after Captain Burton. The following is his account of his visit to Cameron's Lukuga outlet:—

We sailed up a fine open stream-like body of water, ranging in width from 90 to 450 yards of open water. From bank to bank there was a uniform width of from 400 to 600 yards, but the sheltered bends, undisturbed by the monsoon winds, nourished dense growths of papyrus. After sailing 3 miles before the south-east wind we halted at a small bend among the papyrus plants, a few hundred yards north-west from Lumba. I then proceeded farther up the Lukuga. When about 100 yards higher we arrived at the limit of open water, and an apparently inpenetrable mass of papyrus grew from bank to bank. Here we stopped for a short time, and with a portable level tried to detect a current. The level indicated none. We then pushed our way through about 20 yards of the papyrus plants, until we were stopped by mud-banks, black as pitch, enclosing slime and puddles seething with animal life. The second day, with fifteen of the expedition, accompanied by a chief and ten of his people, we started afoot north-westwards, keeping as closely as the nature of the bushes and the watercourses would permit to the Lukuga. I observed that the trend of the watercourses and streams was from north-west to south and S.S.-East. After a march of a couple of hours we came to Elwani village, where the road from Monyis to Unguvwa and Luwelezi crossed the Lukuga. From Elwani we descended by a gentle slope to the Mitwansi tract. At the base of the slope we came to the bed occupied by the Kibamiba and Lukuga. The former was a small sluggish stream with a trend south-easterly. Crossing this we came to the dried bed of a periodical river; whether it should be called the Lukuga or the Kibamiba it would be difficult to say. Prostrate and withered water-cane showed that the flow of the water in the season was lakewards. A few yards further on we reached a point where this bed first became moist, with a dense growth of water-cane flourishing and checking all progress, except by the well-trodden path, which ran through tunnels caused by the water-canes embracing above our heads. Our road lay now through what might be called a swamp, now over a firm path of dark brown clayey mud, then through shallow hollows, with water up to the ankles, which sometimes deepened to the knees. Finally we arrived in the middle of the Mitwansi, and found the water flowing indisputably westward. The stream was up to the knees and felt cold, and on putting a thermometer into it I found it to be only 68° Fah., about 7° cooler than the Lukuga Creek. By pressing the cane down with our feet to allow a free passage for the water, the flow perceptibly quickened. The average depth was about 18 inches. Trees, now dead, were seen in the centre of the bed, which proved the statement of the natives true, that not long ago the Mitwansi tract was dry enough to nourish tamarind groves. This last rainy season has changed it now, for since its termination the tract has become inundated, and a continual waterflow has been observable. The name Lukuga clings to this bed until it passes the Kiganja ridge, when the channel becomes known as the Luindi (some call it the Luimbi), which, flowing by Miketo's Land, passes through Kalumbi's in Rua, and empties into the Kamalondo, a tributary of the Lualaba.

---

[*] Kaart over Jydland, 1:40,000, 131 sheets. Published in 1875-6: Gjöring, Varde, Skalling, Balkhe, Grinsted, Orre and Blaavends Huk. Total since 1870, 21 sheets.

[†] Topografiska Corpsens General Karta öfver Sverige. 1:1,000,000. 3 sheets.

[‡] Topografisk Kaart over Kongeriget Norge (Geogr. Opmaaling) 1:100,000. 54 sheets, in four sections each. Now published 10 A, B, and D, 14 B and D, 16 C, 22 A.

[§] Kjerulf (Th.), Om Trondhjems Stift Geologie. Christiania, 1875.

[||] Atlas universelle de géographie ancienne, moderne et du moyen age, construit par M. Vivien de Saint-Martin. Gravée sous la Direction de M. E. Collin. 1re Livraison: Carte du ciel; Empire ottoman (flle. du N. O.), Région arctique. Paris (Hachette), 1877.

The result of four days' experiments, investigations, and inquiries proved that as far as the south-east end of the Mitwansi tract—which may be called a marsh or an ooze, receiving and absorbing a large quantity of water from the lake, pressed against it by the daily south-east wind—there is no current, but that, on the contrary, the surplus waters, which cannot be absorbed by the already repleted ooze, on the wind subsiding, return to the lake. That for the space of two miles from the south-east end of the Mitwansi the entire bed from bank to bank is choked by immoveable mud-banks enclosing stagnant pools and stream-like expanses of water, edged round with impenetrable growths of papyrus plants. That at the third mile, where the ancient lacustrine deposit is of a firmer quality, and water-cane replaces the papyrus, there first becomes discernible an ooze, a trickle, and a flow westward, which proceeding in that direction at the base of the Kiyanja ridge, is attracted to one proper channel and presently approaches the dignity of a river, when it becomes known as the Luindi.

Mr. Stanley appears, from his map, to have gone down the Lukuga about 5 miles beyond the point reached by Cameron, where it was flowing as a river down towards the Lualaba. In the intermediate space the water, at the time of his visit, was nearly stagnant. He was about to set out from Ujiji for Nyangwe on the Lualaba.

Sir Allen Young.—We rejoice to be able to announce that Her Majesty has conferred the honour of Knighthood on Captain Allen Young, R.N.R., for the important services he performed in the Arctic Regions, during his two voyages in the 'Pandora.'

The Scurvy Committee.—The Report of and evidence taken by the Scurvy Committee will not be accessible before the second week in April; and until this is the case it would be useless to discuss the subject, or to attempt to form any conclusions. The version published by the *Sanitary Record*, and which has misled so many newspapers, is not authentic. We believe that a vast mass of useless evidence has been accumulated from witnesses who have never seen scurvy or who have never been in the Arctic Regions. All this is mere surplusage. But we shall have valuable and interesting evidence from the officers of the late Expedition, and also from the most experienced sledge-travellers of former expeditions, including McClintock, Ommanney, Richards, Hamilton, Allen Young, and Dr. Scott, the surgeon of the 'Intrepid,' in 1852-54. This evidence will fully confirm the views which we have explained in the articles in our numbers for December 1876, p. 373, and January 1877, p. 3. The absurdity of the theory that the cause of the outbreak of scurvy was solely the want of daily rations of lime-juice on the sledges is shown, not only by at least five men having been attacked with scurvy who were either never away sledging at all, or only away for a very few days, but also by the fact that the sledge-parties, which subsequently went away with regular daily rations of lime-juice, were also attacked with scurvy. If we consider that in no previous Expedition was lime-juice ever taken by sledging-parties as a daily ration, the evidence against these theorists is conclusive.

The proposed American Arctic Expedition.—In our number for February 1877 (p. 54), we published the text of a Bill to authorise and equip an expedition to the Arctic Seas, which was brought into the House of Representatives on January 8th, 1877, read twice, and referred to the Committee on naval affairs. The Committee recommended, in February, that the President should be authorised to fit out an expedition to the North Pole, and to establish a temporary colony for purposes of exploration. The scheme is one proposed by Captain H. W. Howgate (an officer in the U. S. army belonging to the signal service), who was Secretary to the Committee appointed to investigate the results of the 'Polaris' Expedition.

It is based on the idea that an open Polar Sea was seen from the 'Polaris,' beyond the northern extremity of Robeson Channel. As there was no such open sea when the English Expedition was in the same neighbourhood, in the seasons of 1875 and 1876, it is assumed that the seasons vary, and that, by patiently waiting on the spot for a few years, a season will occur when the way will be open to the Pole. It is also supposed that the entrance to Robeson Channel may easily be reached by a steamer, when in reality the approach to that channel, except under rarely-recurring and exceptional circumstances, involves the most hazardous and difficult navigation to be met with in the world. It is thought that dog-sledges could travel over the Palæocrystic Sea, another fatal mistake. Captain Howgate's proposal is to establish a colony of fifty men with three years' provisions, at the 'Discovery's' winter quarters, to be visited by a vessel and revictualled annually. They are to have no vessel with them, but to live in a house on shore. There are also to be a number of Eskimos and dogs for sledging. Imaginary water is to be met with before the sledges of this colony reach Markham's furthest in 83° 20′ N., and boats (we are not told how they are to be conveyed towards 83° 20′ N.) are then to proceed to imaginary land in 85° N. There is to be no exploration of the coast lines, but the sole effort is to be to reach the Pole. Manual labour is not to be used in dragging the sledges, and depôts are to be formed on the floes which drift away in June. It appears that the severity of the climate in Lady Franklin Bay has been much exaggerated, and that Captain Howgate considers it not more trying than Mount Washington, in New Hampshire; and he has also discovered that men become acclimatized in Arctic service after a few years.

The Bill for an Expedition is not yet passed, and there is ample time to consider the matter. Captain Howgate's scheme is crude, and based on untenable premises. We trust that the direction of Smith Sound will not be persisted in, as no new work of any kind can possibly be achieved there; and the mere tramping over ground already discovered by the English Expedition, where careful collections in every branch of natural history have already been made, and complete series of observations taken, would be as disheartening as it would be useless. The American geographers will doubtless reconsider the matter, when all the results of the English Expedition have been worked out and are before them. They should adopt a new route where discoveries can be made and useful work done; and we are convinced that the widest and most interesting field left open in that direction would be up Jones Sound, and towards Aldrich's furthest. We have ventured to state our convictions, based on accurate information, thus plainly, because we are anxious, in the interest of geographical research, that the American Arctic Expedition should be successful in making new discoveries and achieving valuable results.

Mr. Strettell's Journey in Burma Proper.—We must draw attention to an interesting account, recently published at Rangoon, by Mr. J. W. Strettell, Deputy Conservator of Forests, of a six months' journey made by him in 1873-4 in Burma Proper, under orders from the Government of India, to report on the *Ficus elastica* there, and the best method of forming plantations thereof in British Burma. Mr. Strettell journeyed to Mandalay, and thence to Bhamo. From Bhamo he made a short excursion eastward to the Kakhyen Hills, and a more extended one northward along the Irrawaddy to Mun-tsoung (latitude 26° N.), where the river forks into two large branches, the eastern being the more important. He then returned and struck westward, making a circuit of the En-daw-gyee Lake, and returned to Bhamo in March 1874. His route coincides in part with that followed by Captain Hannay in 1835-6, and it furnishes us with much information about the nature of the Kakhyens and Shan mountaineers. Mr. Strettell found the *ficus* to extend southward as far as 25° 10′, or half a degree further than the limit assigned to its distribution by Mr. Gustav Mann. Eastward of the Irrawaddy it would appear from native report to be unknown. Mr. Strettell's work is illustrated by a map containing much new topographical information.

The Portuguese African Expedition.—The Geographical Society, recently formed at Lisbon, proposes to devote its energies more especially to the exploration of the Portuguese possessions in Africa. It has already succeeded in obtaining a government grant of 20,000*l.* for that purpose. The commission appointed for the consideration of that question leaves it to government to determine whether the object of the expedition shall be the exploration of the Portugese colonies merely, or whether an effort shall be made to penetrate into the unknown countries of the interior. It recommends the following gentlemen as members of the expedition, viz., MM. A. A. de Serpa Pinto, Cousinho d'Eça, of the navy, R. Ivens, F. B. Capello, Gastaõ Mesnier, H. Bandeira de Mello Madureira, of the navy, and A. de Brito Capello, of the Meteorological Office.

Proceedings of Geographical Societies.

—:o:—

ROYAL GEOGRAPHICAL SOCIETY.

Meeting of February 12th, 1877.

Sir Rutherford Alcock, K.C.B., President, in the Chair. The first of the three lectures, which the president announced in his Address last November were to be given during the session, was delivered this evening by General Strachey, R.E., F.R.S., the subject being "Scientific Geography." At the conclusion the president moved a vote of thanks to General Strachey for his able and instructive lecture.

Meeting of 26th February, 1877.

Central Africa.

The President, Sir Rutherford Alcock, informed the meeting that the two papers about to be read referred to recent explorations in Central Africa. The first by Mr. E. D. Young, R.N., had reference to his late sojourn at Lake Nyassa, where he had the honour of launching the first steamer that had ever appeared on that lake. The second, by the Rev. Roger Price, was on a new mode of travelling in Central Africa.

Mr. E. D. Young then read his paper

On a recent Sojourn at Lake Nyassa.

Mr. Young remarked that all that had been done on Lake Nyassa was directly traceable to a determination to carry out the dearest wish of the great traveller Livingstone, who knew that to launch a steamer on that splendid inland sea, which he discovered in 1859, would do more to paralyse the appalling slave trade carried on by the Portuguese and Arabs in Eastern Africa than anything else. Livingstone's failure to convey a steamer across the falls of the Shiré, had furnished Mr. Young with an experience which enabled him to offer suggestions for another attempt, which had proved a perfect success. Since his previous visits Mr. Young found that an extraordinary flood had altered the course of the rivers Zambesi and Shiré at several points, but nothing materially interfered with his finding a convenient spot at the Kongoné mouth of the Zambesi, whereon to screw together the sections of the small steamer 'Ilala,' nor to impede her passage to the foot of the Shiré cataracts. The falls of the Shiré extend for some 75 miles, and present the only obstacle to the passage of a small vessel from the ocean to Nyassa. After transporting the 'Ilala' across the falls, and launching her on the lake, they made their first stopping place M'Ponda's village, where they met Wakotani, one of the native lads left there by Dr. Livingstone in 1866. A number of scowling Zanzibar Arabs were also met, one of whom pointed to the badge on Mr. Young's naval cap, shaking his head as he walked off with his comrades. A number of slaves were here seen in pens; and the character that the village bore as the chief rendezvous of the slave-traders on the south border of Nyassa was fully confirmed. M'Ponda gave them free leave to settle where they chose in his territory. Leaving M'Ponda's village they soon entered the lake, and coasting along the south-west shore numerous beautiful bays and inlets were examined, and at Cape Maclear a stoppage was made to wood. Mr. Young stated that an enormous population appeared in many places in the neighbourhood of the lake, but he found that the country had been much harried by the Ma Viti, a quasi-caffre tribe, who are now active in supplying the Portuguese of Tette with captives for the special interior slave-trade, which is carried on by them on the Zambesi. Steering an E.N.E. course across the lake, they made for an Arab settlement at Loangwa, which was found to have been destroyed by war, and the occupants dispersed. They then steered back again to Cape Maclear, and finding it necessary to return to the head of the Shiré cataracts they paid M'Ponda another visit. He admitted what a great slaver he was; but pleaded in extenuation that the sale of slaves and ivory was the only means by which he could get clothes and other necessaries from the coast. Mr. Young remarked "that this simple avowal lies at the root of the whole of the East African coast slave-trade. Neither Portuguese nor Arabs will encourage any other trade. Slaves are bought with one hand, ivory with the other; the slaves carry the tusks to the coast, and there both are disposed of. Once let legitimate trade be stimulated by opening up communication by land and by water, so that the india-rubber, the metals, the gums, the cotton, the dye-woods, the ivory, the beeswax, the hard woods, which are to be had in this rich country, can be brought to ports on the coast, and the slave-trade will wither at its roots."

Mr. Young then gave an account of their journey round the lake, and the discovery of a large extension of its waters hitherto unknown.

From Cape Maclear their first stopping-place was at Makinjira's on the south-east of the lake, and proceeding northwards the grand range which towers over Chiloweela was sighted. Reaching Lesefa, which is the principal landing-place for slaves from the western shores, it was noticed that there was a sort of tacit understanding among the Arabs that the 'Ilala' was the thin end of the wedge, and that sooner or later we mean to stop the traffic on this inland sea as we had upon the ocean. Still sailing northwards they passed the islands of Likomo and Chusamoolo. In one spot Mr. Young saw, where a massacre had taken place, skeletons lying in all directions, this being the result of a slave raid on the part of the Ma Viti. It is their rule to slay every adult, without mercy, that is not fitted for the slave-market. Gales seem to come on in this inland sea without any warning, and at times are most furious; therefore Mr. Young was not surprised at Livingstone calling it the "Lake of Storms." They were now abreast of some mountains called the Livingstone Range that, amongst the parallel ranges which virtually make a mountain-basin of Lake Nyassa, exceed them all in stupendous grandeur. In no part of the world had Mr. Young seen anything to equal their peculiar magnificence. With peaks apparently 10,000 to 12,000 feet high, they ran perpendicularly down into the lake; and during the rainy season, numberless waterfalls hang upon them like threads of white floss-silk. To the Arab settlement of Kota Kota was their next cruise, which is a great exporting place for slaves, who are sent eastward. In conclusion, Mr. Young said that his expedition was a perfect success, and although the annual traffic in slaves was about 10,000, his instructions were not to interfere with it, which he considered the best policy while planting missionary stations.

The Rev. J. Mullens next read the Rev. Roger Price's paper,

On a New Route and New Mode of Travelling into Central Africa.

Mr. Price is of opinion that the difficulties of journeying into Central Africa from the east coast and the neighbourhood of Zanzibar are as formidable as may be met with in any part of the world. The distance to Tanganyika is about 700 miles, and seldom is the journey accomplished under 1000*l*. The principal difficulty to be encountered is the system of carriage. Hitherto all English travellers have been dependent upon human bearers, who by their fickleness, dishonesty, indolence, and bodily weakness have given indescribable trouble, and the loss occasioned by the outlay in wages, stolen property, and property left behind for lack of porters, has been exceedingly great. Reflecting on these things, the Directors of the London Missionary Society, when planning their expedition to Lake Tanganyika, requested Mr. Price to inquire whether a route could be found to the north of the Wanu River, on higher ground, and free from the swampy levels found here and there on the road from Bagamoyo; and also if it was possible to employ on the entire line the waggon drawn by bullocks so common in South Africa, and without risk from the tsetse-fly? On inquiry at Sadani, on the coast, Mr. Price was assured that no fly was known on the road which killed bullocks, and that cattle were frequently brought down to the coast from the interior. He therefore at once proceeded to Zanzibar to make preparations and to train bullocks, which proved no easy task, although somewhat amusing. Arriving at Sadani, the entire community turned out to see the expedition start, which included thirty men, four oxen, a riding donkey, and a cart. In nineteen stages, occupying twenty-six days, Mpwapwa, a distance of 200 miles, was reached; the return trip only occupied a fortnight, thus completing the entire journey of 400 miles in forty days. In enumerating the difficulties of this route for waggons and oxen, and the one most feared of all, the tsetse-fly, Mr. Price regards the absence of tsetse at Mpwapwa as settled, for he took the four bullocks the whole of the way, and left them at Sadani on his return in perfect health. Believing the old plans of South African travel to be perfectly applicable to these regions, the London Missionary Society are now fitting out their expedition to Lake Tanganyika on the basis suggested by Mr. Price, which it is expected will commence its march into the interior next July.

An interesting discussion followed the reading of the papers, in which the Bishop of Edinburgh, Sir Bartle Frere, Sir Samuel Baker, and others took part.

ITALIAN GEOGRAPHICAL SOCIETY.

January 17th, 1877.—M. Boutillier de Beaumont, President of the Geographical Society of Geneva, read a paper on an initial meridian. He proposed for that purpose a meridian passing through Behring Strait. He also proposes to state the difference of longitude in hours of sixty minutes, instead of in degrees.

January 21st, 1877.—Signor M. C. Maraini in the chair. The Secretary read letters from Signor L. M. de Albertis, describing his exploration of the Fly River in New Guinea.

Capt. Camperio discussed the advantages of the Smith Sound route, and of that between Greenland and Novaya Zemlya, giving the preference to the former.

The President announced that the sum contributed by

Government, and collected privately, for defraying the expenses of the African Expedition now amounted to £6060.

PARIS GEOGRAPHICAL SOCIETY.

February 7th, 1877.—M. LEVASSEUR in the chair. From letters read by M. MAUNOIR, the Secretary, we learn that the Abbé Charles Dallet is about to visit China, Japan, Manchuria, Tibet, and various portions of India, with a view to the collection of materials for a history of Foreign Missions; and that the Rabbi Mardokhai is preparing to leave Mogador for Timbuktu. The latter solicits the assistance of the Society, and amongst other things asks for twelve revolvers, a telescope, and a good watch.

M. BRAU DE ST. POL LIAS reports from Sumatra that he and his band of "Exploring Colonists," had been favourably received by the Dutch, and the native authorities, and that the Sultan of Deli had granted them a large plot of land on the River Bedagi, to the south of Deli, upon which they had installed themselves.

M. LARGEAU announces from Biskra his approaching departure for Tuat, and that he proposes to solicit the good offices of the Ulad Bajuda of Ain-Salah in favour of his scheme of visiting the Hoggar Country. In going to Tuat he will follow the bed of the Wed Miyah.

In a letter from Dr. PETERMANN, that geographer pressed upon France the participation in coming Arctic Expeditions, and thought that a summer-tripre commended itself most.

M. E. CORTAMBERT reported favourably on M. Lenthéric's work on the Dead Cities of the Lion Gulf (Golfe du Lion).

February 21st, 1877.—M. E. LEVASSEUR in the chair. The secretary, M. MAUNOIR, read the correspondence received. M. LARGEAU writes that he is ready to penetrate into the interior, but is still very much in want of funds, without which success cannot be guaranteed. M. CESARE MORENO, who has passed four years in the service of the Sultan of Achin, communicates some particulars on that country. The secretary likewise reported on Dr. Holub's journey to the Zambesi, Captain Young's exploration of the Nyassa, and Mr. Bryan's scheme of Polar exploration, by means of ships and stations permanently established in a high latitude.

M. CHARLES VELAIN read a paper on the crater lakes of Nossi-bé, which abound in fish, but cannot be approached on account of the large number of voracious crocodiles.

GEOGRAPHICAL SOCIETY OF LISBON.

AT a session of the Permanent Central Commission of Geography, held on the 9th December last, presided over by the Councillor, Jorge Cezar de Figaniere, Senor Luciano Cordeiro said that, it appearing to him necessary to issue some kind of plan, which should, however, not be considered a definite one, but simply a draft open to discussion, he would read the following:—

1st.—An expedition to be organised for scientific and commercial exploration in Central Africa, at the cost of the State, and intended—(1) to investigate the conditions of climate, configuration, production, population, communications, and topography of the territory travelled through, determining the respective geographical points, and endeavouring to obtain the best data for the geographical knowledge of unknown regions; (2) to establish commercial and friendly relations with the people or states it may come in contact with; (3) to rectify, when possible, the frontiers of former and present Portuguese dominions towards the interior, that is, east and west; (4) to study the means of extending the civilising and commercial action of Portugal towards the interior; (5) and finally to collect all such geographical information as may be useful to science, to commerce, and to civilisation.

2nd.—A staff to be selected for this purpose, consisting of persons who combine with the necessary physical and moral conditions, special aptitude and scientific attainments for the object in view, and experience in meteorological, astronomical, and geodesical observations.

3rd.—The expedition to be composed of six scientific explorers, and of such a staff as may be considered necessary for security and service.

4th.—The expedition shall ascend the Zaire as far as Porte da Lenha by state transport, and shall there establish its first base of operations, proceeding to explore that river in its near ramifications in boats properly prepared, and making the necessary excursions to the three arms, known by the names of Maxwell, Mamballa, and Sonho, taking the proper notes for their future laying down.

5th.—After this first essay, the expedition to be divided into two groups, composed of three scientific explorers, the senior to act as chief in each one.

6th.—One of the groups shall follow the Zaire in a N.E. direction and endeavour to strike the objective point in the Sankorra, or in the Myangowe, without losing sight of the efforts it should make to explore and accquaint itself with the water-way as far as may be possible. In the event of reaching the Sankorra, it will endeavour to study this lake and ascertain whether the Lualaba discharges into it, and the Zaire runs out of it, and, according to what information it may obtain, will continue in the direction of Lake Tanganyka, endeavouring at the same time to find out, as well as it can, the course of the Lualaba and its tributary the Lukuga.

7th.—The second group will travel south towards the interior, if possible, till it strikes the superior affluents or the falls of the Quanza and the Zambesi.

8th.—Both these groups will have the same objects of the expedition in view, as are above enunciated.

9th.—A central executive commission to be formed, subject to the previous accord and approval of the Government, of two effective fellows of the central permanent commission, and of two members of the Geographical Society of Lisbon, under the presidency of the Minister for Marine and Colonies, shall undertake to see that during the continuation of the expedition it shall not lack the means and assistance necessary, to superintend the transmission of articles it may be desirable to send out, to distribute the subsidy voted for the expedition, and arrange to receive regular communications, &c., from it.

The government will order all departments and national authorities to render the expedition the utmost aid and protection, and, after consulting such corporations as it thinks fit, will select and contract with the explorers, subject to such conditions as may be agreed upon. DUPRAT.

NOTICE.

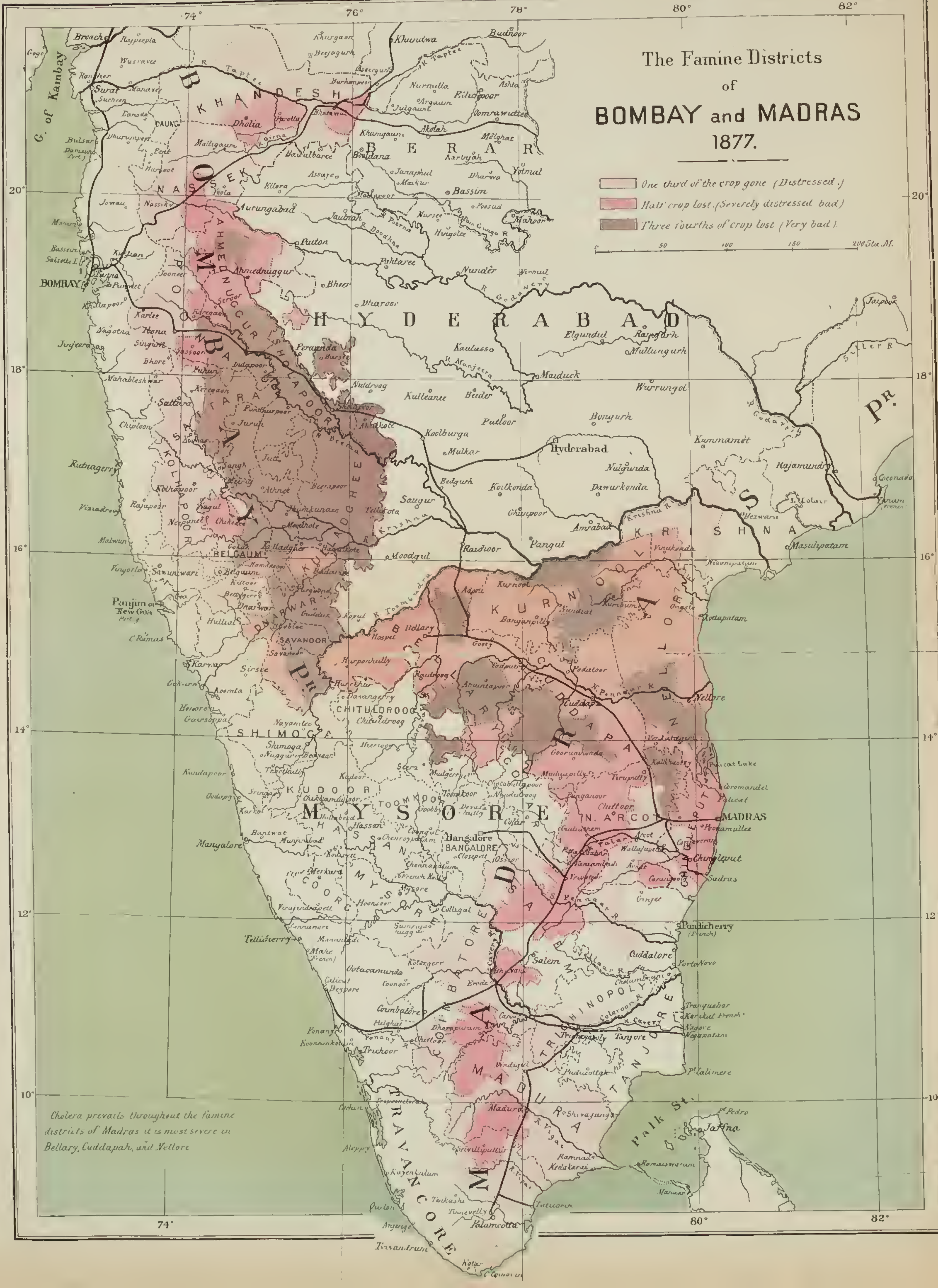
The Office of THE GEOGRAPHICAL MAGAZINE *is at* 57 & 59, *Ludgate Hill, E.C.*

Manuscripts sent to the Editor cannot be returned, nor can the Editor be responsible for them.

Letters and Articles intended for insertion should be written on one side of the paper only, and must be accompanied by the name and address of the writer; not for publication, but as a mark of good faith.

The right of translation is reserved.

Annual Subscription and Postage, £1, *Inland. Foreign Orders must be accompanied by P.O.O. or Cheques to include the full amount of Foreign Postage. Post Office Orders to be made payable to Messrs. Trübner & Co.,* 57 & 59, *Ludgate Hill, London, E.C.*



The Famine Districts of BOMBAY and MADRAS 1877.

- ▢ One third of the crop gone (Distressed.)
- ▨ Half crop lost. (Severely distressed bad)
- ■ Three fourths of crop lost (Very bad).

Cholera prevails throughout the famine districts of Madras it is most severe in Bellary, Cuddapah, and Nellore

THE

GEOGRAPHICAL MAGAZINE.

MAY, 1877.

THE FAMINE IN MADRAS AND BOMBAY.

The great famine of 1873-74 in Bengal has been followed, with alarming rapidity, by the present scarcity extending over a large area of the Madras and Bombay Presidencies. The duty of relieving the distress thus caused, and of sanctioning large expenditure, in order to prevent loss of life, has been fully accepted by the Government of India; and the provision for this expenditure has consequently become an administrative question of paramount importance. Under these circumstances the duties of organising an efficient means of obtaining accurate agricultural statistics, and of practically applying the deductions of meteorological science must henceforth take a foremost place. For complete knowledge on these points will furnish the administrator with the means of anticipating scarcity, of estimating the cost of providing against it, and of adapting his measures to the exigencies of each case as it arises. On former occasions the inability to avert frightful mortality in one instance, and the enormous expenditure in another, were both due to want of knowledge.

In our number for February, 1874 (p. 441) we gave some account of the principal features of the Bengal famine; and in that for March, 1875 (p. 73), Mr. H. P. Malet, who had himself administered the district of Sholapore during a time of famine, gave some further details, and pointed out the immense importance of a season of scarcity being anticipated, and of there being sufficient warning to give time for the necessary measures for meeting it. Mr. Malet described to us the policy he adopted in Sholapore, at the time of the great famine in 1833-34. The failure of rain means a failure of food, and this ought to be known in the previous August. The Banyans were then consulted as to their stock in hand, and were informed that the Government intended to give occupation to unemployed labour. Estimates were made of the probable demand for grain, and the Banyans were asked if they could meet it at their own price, the Government undertaking to pay their bills. In Sholapore, in 1833, they undertook this duty; they imported during the season sufficient food for all demands, and secured to themselves the profits of their arrangement. The relief works were carefully organised, and under these arrangements the Sholapore district met an extensive famine with success.

The essential points, in famine administration, are an early warning of the approach of a year of scarcity, exact knowledge as to the quantity of grain existing in the various districts, a famine code as regards the best system of relief works, and a complete understanding between the Banyans and the Government, so that the extra demand for grain may be met by the operations of private trade.

The admirable revenue settlement and survey of Bombay, which includes a complete system of recording agricultural statistics, and the well organised village communities, have enabled the government of that presidency to keep the famine well in hand. We may compare the state of affairs in the beginning of the present century, and the arrangements in force to meet the present scarcity, with feelings of pride and satisfaction at the results of half a century of English administration. In 1803 there could be no meteorological forecast, because famines were as often caused by the devastation of Mahratta cheifs as by the failure of rains, and frequently by a combination of both forms of calamity. The readers of Lord Valentia's travels* will remember how, in October, 1804, the roads of the Deccan were strewn with dead bodies, and the people were perishing by hundreds. Yet even then, though the Peishwa was still ruling at Poona, the British Government at Bombay fed 12,000 people from stores of rice procured from Bengal. Now a complete system of relief works is organised, the supply of grain fully meets the demand, and the officials of the Bombay Presidency have got the famine well in hand.

In 1876 the north-east monsoon failed over a great portion of the Madras Presidency, and this was followed by a failure of the south-west monsoon which rendered a great scarcity inevitable over a vast area both in Madras and Bombay. In December it was calculated that 80,000 square miles, with a population of 18,000,000, would be affected in the Madras districts of Cuddapah, Bellary, Karnúl, Madura, Chingleput, the Arcots, Salem, Kistna, and Coimbatore; and 54,000 square miles, with a population of 8,000,000, in the Bombay districts of Khandesh, Nasik, Ahmednagar, Sholapur, Satara, Kaladgi, Belgaum, and Dharwar; and the cost to the State of relieving the necessities of the sufferers was calculated at 4,380,000*l*. There were, in December, 840,000 people on the relief works in Madras, and 250,000 in Bombay; and it was anticipated that the distress would increase in intensity until April, and then gradually diminish, ceasing in September. The scarcity of fodder for cattle, without which the land cannot be cultivated, is nearly as great a calamity as the failure of the food crops; and, as early as November, it was conceded, in the Bombay Presidency, that forest reserves might be made free grazing grounds in the distressed districts.

---

*II. p. 108.

One of the most important points connected with famine administration is the organisation of relief works. The main objects must be that they should be as economically managed as possible, and that they should be thoroughly under official control in all the details of their management. Hence, although when scarcity is confined to one district, the relief works may properly consist of small undertakings, such as local roads and the repairing of tanks near the homes of the sufferers, it is necessary to organise works on an extensive scale, and to concentrate large bodies of recipients of relief, as soon as the famine spreads over a large area, in order to secure efficient control.

The lessons of the present famine will be that the systems of recording agricultural statistics must be put on a thoroughly efficient footing throughout India, that a famine code must be prepared, so that local officials will clearly understand the principles on which administration in times of scarcity should be based, and that close attention must be paid to the teachings of meteorology.

In the course of his recent tour of inspection, Dr. Hunter had occasion to study the coincidences of famine years in the Madras Presidency with minimum sun-spots, and he has drawn up a very interesting memorandum giving the results of his investigations.

In 1865 Chacornac and Lockyer discovered that the spots are produced by a down-rush of the cooled external atmosphere of the sun.

In 1872, at the meeting of the British Association at Brighton, Mr. Meldrum, of Mauritius, brought to notice the fact that the cyclones of the Indian Ocean vary in frequency with the periods of sun-spot frequency; and since that time several attempts have been made to trace out the evidence of a similar periodicity in other meteorological phenomena. Mr. Meldrum and Mr. Norman Lockyer have done so in the case of the rainfall of Mauritius, Australia, and South Africa; and Professor Koppen has arrived at a similar conclusion in the case of air temperature. In 1867, Mr. Joseph Baxendell, of Manchester, traced out a distinct and very striking relation between the number of sun-spots, and the ratio that exists between the difference of the mean maximum temperature of solar radiation and the mean maximum temperature on the one hand, and that of the mean temperature of the air and of evaporation on the other. The whole subject has recently been discussed, in a very interesting paper, by Mr. H. F. Blanford, the Meteorologist to the Government of India.* His conclusion is that the sun's heat varies from year to year to such an extent as must appreciably affect terrestrial phenomena. His observations with a maximum thermometer, the bulb of which was coated with lamp black, and which was enclosed in an exhausted tube, were commenced in 1867; and the results agree in showing a very decided variation of the incident solar heat. He concludes that if the sun's radiation varies with the number of spots and prominences, every other meteorological phenomenon must likewise so vary, rainfall and temperature included; and there are, therefore, *a priori* grounds for the validity of the discoveries of Meldrum, Norman Lockyer, and Koppen.

Mr. Blanford thus concludes his paper: "It is needless to point out that a vast train of enquiry is opened up by the fact, once established, that the solar heat undergoes a periodical variation. It is, I believe, of high importance to meteorology, or will be so when the amount of variation shall have been ascertained in terms of absolute measurement, and it affords a strong additional incentive to the establishment of an observatory in India, such as has already been founded under the less favoured skies of Germany and the Rocky Mountains, for observing and measuring the variations of the sun. These, and their immediate effects are, by prerogative, the study of the tropics." It is to be hoped, therefore, that regular actinometric observations may soon be undertaken at the new solar observatory under Colonel Tennant, at Simla.

Mr. Pogson, the astronomer at Madras, holds that the periods of minimum sun-spots are the periods of maximum heat; and he estimates the direct solar heat of the tropics at several degrees higher during the period of minimum maculation than during the opposite period when the sun-spots most prevail. In arid tracts excess of heat prevents vapour from condensing into rain-clouds, and the usual rain-supply would then be carried over such tracts in a gaseous state, by the prevailing winds, until meeting cooler currents.

Struck with this theory, Dr. Hunter made a close study of the Madras rainfall with reference to sun-spots, and arrived at certain provisional conclusions. There is a record of the rainfall at Madras extending over sixty-four years, from 1813 to 1876, and the average yearly fall is 48·51 inches. On a close examination Dr. Hunter found nothing like a *uniform* increase or decrease of rainfall in proportion to the increase or decrease of sun-spots. The sun-spots run through cycles of increment and decrease varying from nine to fourteen years, taking only three or four years to rise from the minimum to the maximum, and seven or eight to descend again to the minimum; and Dr. Hunter found that the minimum period in the cycle of sun-spots was a period of regularly recurring and strongly-marked drought in Southern India. Thus there is a cyclic coincidence between the rainfall and the sun-spots.

The years of famine in Madras were 1811, 1824, 1833, 1854, 1866, and 1877, there being deficient rainfall in the preceding years. The years 1810 and 1823 were years of minimum sun-spots, 1832 was a year preceding minimum sun-spots, 1853 was the third, and 1865 and 1876 were the second years preceding minimum sun-spots. In all these years the rainfall was far below the average of 48·51 inches, and it has been found that 20 inches below the average produces a famine.

The general conclusions arrived at by Dr. Hunter are that there is no uniform relation between sun-spots and rainfall, but that the minimum sun-spots coincide with years of drought. The droughts recur in cycles of eleven years, on the second and eleventh years, which series contain six out of seven years of minimum sun-spots. Dr. Hunter carefully guards himself from being supposed to offer any theory, and his conclusions only apply to Southern India. The materials are too scanty to permit of inferences, and he merely records the indications to which they point.[*]

---

* "On some recent Evidence of the Variation of the Sun's Heat," read June 2nd, 1875. *J. A. S. B.* xlv., Part II. (1875).

We have drawn special attention to Mr. Blanford's paper and to the interesting investigation into the Madras rainfall by Dr. Hunter, because they show the great importance of meteorology in Indian administration, and the close connection and alliance that should exist between scientific work and practical statesmanship. If there is, in future, to be ample warning of an approaching famine, and if the scarcity caused by failure of crops is to be kept well in hand when it does come, there must be a more thorough and systematic record of agricultural statistics throughout India, and a due appreciation of the importance of meteorology.

THE HIMÁLAYAN SYSTEM.

(*A reply to an Article in the "Calcutta Review" of January*, 1877.)

The structure of the great Himálayan mass, bounding India on the north, is a subject to which many travellers and systematic geographers have devoted a large share of their attention. The difference in the views that have been enunciated arise, not so much from any divergence as regards physical facts, as from a misunderstanding of definitions, and, in some cases, from failure to comprehend the subject in all its bearings. A writer in the *Calcutta Review* of January 1877, in criticising my Introduction to the *Narrative of the Mission of George Bogle to Tibet*, has put forward a view of the question which combines two faults, namely, erroneous nomenclature, and a misconception of the physical geography of the region of which he treats. But, as this is the latest attempt to discuss a very important geographical question, I propose, in noticing it, to take the opportunity of offering some account of the various systems that have been formulated. It will be seen that, in reality, it is a mere question of definitions, arising, in a great measure, from a failure to understand the subject—in other words, from a want of geographical insight.

As regards the earlier attempts at generalization, I cannot do better than repeat, in fewer words, the account I gave in the *Memoir on Indian Surveys* (p. 247). I there said that the reports of a long series of travellers necessarily preceded the first effort at generalization, and that Captain Herbert was the first geographer who attempted to give a general view of the physical character of the Himálaya.

Writing in 1818, Captain Herbert's information was necessarily limited, but he had before him the narratives of several Himálayan travellers, and he had a personal knowledge of the western part of the range, from the Kali to the Sutlej. He was the first to point out that the line of water-parting was not always synonymous with that of greatest elevation. In exploring the Western Himálaya he could distinguish no continuous chain of elevation on a cursory glance. There seemed to be nothing to lend a clue to the development of the mountain masses, and there appeared only an assemblage of elevated peaks confusedly heaped together. But he soon perceived that by tracing the courses of the rivers and tributary streams, a clue would be found to lead an observer out of this labyrinth. As regards the part of the Himálaya from the Sutlej to the Kali, instead of a succession of parallel ranges rising one behind another in regular array, he made out a continuous chain forming an irregular curved line, with the Sutlej bounding it to the north and bending round its convex side, while the sources of the Ganges rise within its concavity. He called this the Indo-Gangetic chain, and his description of it is precise and accurate. His next chain is that separating the sources of the Jumna and Ganges. He adds that the ramifications of ridges would almost bid defiance to any analysis, but for the assistance derived from observing the courses of the rivers. He observed that the ridge separating the Ganges and Indus basins was not the highest ground, and that the most elevated peaks were on a series of transverse ridges which seem to ramify from the Indo-Gangetic chain, over which they tower several thousand feet. He traced a connected line of peaks, not under 21,000 feet in height, and intersecting the water-courses, and concluded that they did not form a range of mountains because rivers broke through them. This erroneous notion of the essential character of a range of mountains explains his misconception of the Himálayan system. A *cordillera*, or range of mountains, is a ridge of elevated land running in one general direction, and the fact of its being cut through by one or more rivers does not alter its character and convert it into a series of spurs or ramifications. It still remains a range of mountains, and any other conception of it would give a most erroneous idea of its physical character. The theory that when a chain of mountains is cut through by rivers it becomes a series of spurs was thus originated by Captain Herbert, and may be called the Herbert theory. It was adopted by Dr. Thomson, Mr. Brian Hodgson, and Dr. Hooker.

Dr. Thomson was the first traveller, after the Chinese pilgrim Fa-Hian, who reached the summit of the Karakorum Pass, and he has discussed the physical structure of the Western Himálaya with great ability. Following Herbert, he considers that the only feasible mode of division is afforded by the courses of the different rivers. If these be taken as guides, he holds that the mountains will be found to resolve themselves into two great systems; and he gives Herbert the credit of having first pointed out the impropriety of regarding the Himálayas as a single chain running parallel with the plain. He proposes to call Herbert's Indo-Gangetic the Cis-Sutlej, and the chain commencing at Kailas the Trans-Sutlej Range.

Mr. Brian Hodgson, during a long residence in Nepal, thought much over the configuration of the mountains towering above the Valley of Kathmandu. In his paper on the Physical Geography of the Himálaya, he describes the Nepal division of the system as consisting of three river basins, those of the Karnali, Gandak, and Kosi, separated by peaked ridges parallel to each other, and at right angels with the main chain. Dr. Hooker adopted the same view.

---

[*] *The Cycle of Drought and Famine in Southern India*, by W. W. Hunter, LL.D., Director-General of Statistics to the Government of India. (Calcutta, February, 1877).

He described the great Himálayan mountain mass as a prodigious chain traversing Asia from east to west, and south of it flow the Indus and Brahmaputra, in different directions, rising nearly together. The chain between these rivers and the plains of India is the Himálaya. The axis of the main Himálaya lies far back and nearer to the two great rivers than to the plains; while, from the central axis, successions of secondary ranges descend on either side. These secondary ranges vary in direction, some being almost perpendicular to the main range, and others forming a very acute angle with it. Dr. Hooker thus considers the system as consisting of a main range, with numerous secondary chains branching from it, but all connected with the central axis, and not forming distinct mountain ranges. He says that Herbert's proposition of the line of great peaks intersecting the river basins and not forming the true axis, was the first enunciation of a very important fact in physical geography. "In Sikkim," he says elsewhere, "the Himálayas consist of meridional ridges separated by water flowing southward. They are not a continuous snowy range." The same view is repeated by Mr. Heeley in his article on Tibet in the *Calcutta Review* of July 1874 (p. 139).

This is the Herbert theory. The range rising from the plains of India has a continuous line of the loftiest peaks in the world, generally connected by ridges, and is in all respects a mountain chain—the southern range of the Himálayan system. But because the ridges are, in certain places, cut through by rivers rising in the central range of the system, this theory would convert a well-defined mountain chain or *cordillera* into a series of spurs from the central range. The misconception evidently arose from a too literal interpretation of the word "chain," which it was supposed could not continue if any of the links were broken. But a broad view of the subject will make it clear that a chain, even when partly cut by rifts, is still a chain, and is distinct in its origin and its character from a mere spur or ramification. The long series of peaks of enormous height continuing in one line for hundreds of miles along the southern Himálayan Range, establish it as a distinct cordillera or rope (rather than chain), though some of its strands are worn by the action of water.

Dr. Forbes Royle discussed Himálayan geography in his great work illustrating the botany of the mountains; and General Cunningham, in his work on Ladak, gives a general view of the physical features of the Western Himálaya, from the bend of the Bias to the Indus. He holds that the most striking characteristic of the system is the parallelism of the mountain ridges which stretch through the country from S.E. to N.W. He divides the mountain system into six distinct ranges: first, the Karakorum Range, from the sources of the Gilgit to that of the Shayok; second, the Kailas, or Gangri Range, from the source of the Indus to its junction with the Shayok; third, the Trans-Himálayan Range; fourth, the Great Himálaya; fifth, the Mid-Himálaya, or Pir Panjal; and sixth, the Outer-Himálaya. The Mid-Himálaya and Great-Himálaya of Cunningham would be the Cis-Sutlej and Trans-Sutlej ranges of Thomson; and the former would be the Indo-Gangetic range of Herbert.

Henry Strachey, in his general sketch of Western Himálayan geography, adopts the native Tibetan nomenclature. He considers the general plan of the mountain system to be a series of parallel ranges running in an oblique line to the general extension of the whole; the great peaks being generally on terminal butt ends of the primary ranges. The chief watersheds are often found to follow the lowest of the ridges, and the channels of drainage to cross the highest; deep fissures intersecting the mountains, often directly transverse to the main lines of elevation.

A more recent systematic attempt to give a general idea of the physical structure of the Himálayan region will be found in the sketch map and memoir prepared by Mr. Trelawney Saunders. He considers the Himálayan region to be included between the plains of India and the upper courses of the Sanpu, Sutlej, and Indus, and to extend from the gorge of the Indus to that of the Brahmaputra, a distance of 1400 miles. According to Mr. Saunders the system, within these limits, culminates in two parallel ranges running through the entire length, which he calls the Northern and Southern Himálayas respectively. According to the Herbert theory, the Southern Himálaya does not exist. Nearly all the great snowy peaks are in the Southern Range; but it is the Northern Range which forms the water-parting between the Ganges basin and the Sanpu. A series of valleys separates the two ranges, and through them flow the upper courses of the Jhelum, Chenab, Spiti, Baspa, Ganges, and numerous affluents of the Ganges and Brahmaputra in the direction of the Himálayan axis, until they break through the Southern Range to join the main streams in the plains of India. The Indus, Sutlej, and Sanpu form a continuous trough in the same axial direction, and divide the Northern Himálaya from the Karakorum and Gang-dis-ri Mountains. The Karakorum divides the Indus basin from the basin of Lake Lob, and the Gang-dis-ri separates the Indus, Sutlej, and Sanpu from the elevated plateau of Tibet, which is drained by inland lakes. This general view is clear and perspicuous, and is made more so by the excellent map which accompanies Mr. Saunders's memoir.

I now come to the view of this question given in my Introduction to the *Narrative of the Mission of George Bogle to Tibet*, which has been the object of a laboured attack in the *Calcutta Review* for January 1877. My intention was to give a systematic idea of the great mountain mass which intervenes between the plateau of Tibet and the plains of India, including the Karakorum and Gang-dis-ri Range, which is not included in the Himálayan system by Mr. Saunders. I, therefore, treated of three main ranges, considering the Karakorum and Gang-dis-ri as the Northern; Mr. Saunders's Northern Range as the Central Himálaya; and the other the Southern. I described these as three great culminating chains, running more or less parallel to each other. The Northern Range is divided into a western and an eastern section. The western is known as the Karákorum Range, separating the valley of the Indus from the basin of Lake Lob. The sources of three great rivers are on the southern slopes of the Northern Range, and force their way through the Central and Southern Ranges, namely, the Indus, Sutlej, and Brahmaputra. The eastern section of the Northern Range separates the inland system of lakes on the Tibetan plateau from the valley of the Sanpu or Brahmaputra. It is sometimes known as the Nyenchhen-tang-la mountains, and Mr. Saunders proposes that it should be called the Gang-dis-ri Range. Parallel to the Northern Range runs the Central Range of the Himálaya, the two enclosing the upper basins of the Indus, Sutlej, and Brahmaputra. On its southern slopes are the sources of many rivers which force their way through the Southern Range of the Himálaya, and eventually reach the plains of India. The Southern Range consists of a stupendous chain of snow-clad mountains, with a line of culminating peaks, and with slopes deeply furrowed into alternate ravines and ridges, the distance between the culminating ridge and the plain averaging about 90 miles; and this range is cut through by several rivers which rise in the Central Range beyond.

In noticing the Herbert theory, according to which the Southern Range is not a *cordillera*, because it is broken by the defiles through which the rivers force their way, which rise in the Central Range, I pointed out that this is not a question of fact, but of correct definition. If a cordillera is a range of mountains through which rivers force their way, as well as one which has an unbroken water-parting, then the Southern Range of the Himálaya is undoubtedly a cordillera or chain of mountains.

The Calcutta Reviewer fancies that he settles the question by saying that a row of unconnected links does not constitute a chain, and that the essence of a chain is the continuous connection of its links; and he goes on to assert that chains and cordilleras are not synonymous terms, and that cordilleras are bifurcations. They are nothing of the kind. The following definition of a cordillera, from the dictionary of the Royal Academy of Spain, is decisive on this point: *Cordillera —la continuacion de algunos cerros que, por alguna distancia, se siguen unos á otros en derechura.* A cordillera, then, is a range, or ranges of hills, continuing one after another in a direct line, whether broken through by ravines or not. The continuous line of lofty peaks with connecting ridges constitutes the Southern Range of the Himálaya a true cordillera. According to the Herbert theory, which is adopted by the Calcutta Reviewer, the Central Range is not a cordillera either, as it also is broken through by the gorges of the Indus, Sutlej, and Brahmaputra, which is a *reductio ad absurdum;* for, thus, if the theory be correct, there is no Himálayan Range of Mountains at all.

The notion that a chain of mountains must culminate in a continuous water-parting is a fallacy. A great mountain system does, but it usually consists of two or three distinct cordilleras or chains, and some of them are, as a rule, cut through by river courses, though each, also, forms a distinct water-parting of its own. We have seen that this is the case in the Himálayan system, in which the Central and Southern Ranges are both cut through by rivers, though the Northern Range is not. It is also the case in the Andes. In both systems—the Himálayan and the Andean—a chain of mountains, with a continuous series of culminating ridges and a continuous slope, is a true cordillera, whether rivers force their way through its gorges or not. A spur is a ridge running off from the cordillera, and gradually sinking into the plain. A continuous line of peaks along the axis of a mountain system is not a spur, but a cordillera or chain.

In my Introduction I pointed out that the analogy between the two great mountain masses of the Himálaya and the Andes was very remarkable. Both consist of three parallel chains. In both, great rivers have their sources in the inner chain, and force their way through the other two. The cuesta of La Raya, separating the valley of the Vilcamayu from the basin of Titicaca, is the counterpart of the Marian-la-saddle, dividing the basin of the Sutlej from the valley of the Brahmaputra. In both systems numerous rivers rise in the central cordillera, and, after lateral courses between the two, eventually force a way through one or other of the two outer chains. The Southern Range of the Himálaya bears an exact analogy to the outer Andes, which rise from the valley of the Amazon. Both have a low range at their feet, enclosing valleys or *duns;* both have deep gorges, separated by lofty ridges, which are spurs from a main chain of culminating snowy peaks, and in both several rivers rise in an inner central range, and force their way through profound ravines between the culminating summits. The rivers Mapiri and Chuqui-apu pierce the eastern cordillera, flowing through chasms in beds 1800 feet below the snowy peak of Illimani, which almost overhangs one of them. Yet no one maintains that the "Cordillera Real de los Andes" is not a chain of mountains! In like manner the river of Santa, after a long course in a northerly direction, between the Maritime and Central Cordilleras, in the remarkable lateral valley known as the Callejon de Huaylas, at last bursts through a narrow and profound chasm in the former range, and pours itself into the Pacific. According to the Herbert theory, this chasm would also deprive the Maritime Cordillera of its place among mountain ranges.

The theory that a chain of mountains ceases to be one, and becomes a series of spurs, because one or more rivers force their way through its chasms is untenable; and a system based on such a theory would be confusing and erroneous. A cordillera, or chain of mountains, is correctly defined, by the Royal Academy of Spain, as a range or ranges continuing in one direction along a common axis, whether broken by chasms or not. A spur, on the contrary, is an offshoot from a cordillera, gradually sinking into a plain. The Maritime and Eastern Cordilleras of the Andes, and the Central and Southern Ranges of the Himálaya are true mountain chains, with continuous series of culminating peaks, though all four are broken through by rivers. All four also have numerous spurs. In the Andes these spurs form the deep ravines of the montaña, gradually subsiding into the Amazon valley on one side, and the lateral ridges ending in promontories of the Pacific coast on the other. In the Southern Himálayan Range the spurs run out at right angles with the line of culminating peaks, and form the valleys of Bhutan, Sikkim, Nepal, and the rest.

The Calcutta Reviewer attempts to dispute the analogy between the two great mountain systems of the old and new world; but avowedly without any special knowledge of the latter. He tells us that in the mountain system north of India there is no counterpart to the succession of elevated valleys in the Andes. The upper basins of the Indus, Sutlej, and Brahmaputra are their exact counterparts; while the valleys of the Chamto-dong and other Tibetan lakes are formed by those bifurcations and reunions of the Central Himálayan Range, which also occur in the Andes, and which the Reviewer there calls "unique!" He says that the only instances of elevated valleys in the Himálaya, such as those in the Andes, are Kashmir, Kathmandu, Pokhra, and, possibly, Jumla. The counterparts of the elevated valleys of the Andes are the elevated valleys between the Northern and Central Ranges of the Himálaya, containing the upper courses of the Brahmaputra, Sutlej, and Indus. The lower valleys of Kashmir, Kathmandu, and the rest, have nothing to do with this comparison; although they also have their exact counterparts in the Andean system. The Kashmir Valley is between the Central and Southern Himálayan Ranges, while Kathmandu is on the slope of the Southern Range. The Reviewer's "blunders" (a favourite expression of his) culminate with the notion that the Illimani and Illampu (Sorata) peaks are offshoots of an imaginary lower range nearer to Lake Titicaca, which he calls the "real eastern watershed" (meaning water-parting).

The Reviewer should have refrained from discussing these points relating to the Andes, of which he knows nothing, and confined his lucubrations to the Himálayas, which he professes to have studied closely in nature and on most modern maps. He calls the whole Himálayan system the Indo-Tibetan, and tells us that the key to this Indo-Tibetan system lies in the valleys of the Indus and Brahmaputra, and their affluents. But at the very outset his erroneous geographical nomenclature leads to confusion. To the Northern and Central Himálayan Ranges he gives the names of the "Main Northern Watershed" and the "Main Southern Watershed;" applying the term "watershed" to the ridge or water-parting which is continuous in the Northern Range. It is not continuous in the Central Range, even within the limits that he would prescribe to it, for the Sutlej breaks through it, so that his theory is disposed of by this physical fact at the very outset. The Reviewer assumes that the River Karnali also breaks through the Central Range (his so-called "Southern Watershed"), and so makes his own case still worse. However, the Sutlej certainly does force its way through the famous gorge at Shipki. The Reviewer coolly remarks: "These breaks do not affect the delineation of the Southern Watershed in regard to the Indus and the Brahmaputra, to the valleys of which, and of their affluents, be it remembered, we described it as the limit." But these breaks very materially affect the Reviewer's theory. The "Southern Watershed," as he calls the Central Himálayan Range, is cut through, not only by the Sutlej, but also by the Indus and Brahmaputra, and, consequently, ceases to be a range of mountains at all, from his point of view, any more than the Southern Range. For the Reviewer "disputes the appropriateness, in a geographical sense, of the term chain, or of any other term implying continuity" to the Southern Range, because it is cut through by several rivers. So that, on his own showing, his "Main Southern Watershed" (the Central Range) is no more a continuous chain than the Southern Range. His theory is irreconcilable with the acknowledged physical facts.

The errors in the Reviewer's system are partly due to his incorrect nomenclature, and especially to his calling a dividing ridge or water-parting a "watershed," which is quite a different thing. The Reviewer says: "As we have the high authority of Mr. H. F. Blanford (*Physical Geography for the Use of Indian Schools*, p. 169) that the last syllable of watershed is derived from the Anglo-Saxon *sceadan*, to part or divide, we see no reason to abandon the older and better-known term." Mr. Blanford has adopted a mistake which is natural enough, and which is made in the 1868 edition of Webster's Dictionary. Misled by the similarity in sound, it was supposed that *watershed* and *wasser-scheide* were one and the same. It is important that the definitions should be again clearly stated, for systematic geography is impossible without accurate nomenclature.

In English geography a *water-parting*, called a *divide* by the Americans, *wasser-scheide* by the Germans, and *ligne ou faîte de partage des eaux* by the French, is the ridge which separates the flow of water on either side of a range of hills. The German *scheiden* means to divide or part. A *water-shed* is the space intervening between the water-parting and the bottom of the valley down which the water is shed. It is called *abhang* (slope) by the Germans, and *versant* by the French, from *verser*, to shed. The English words *shed*, *shade*, and *scatter* are all, according to Richardson, derived from the Anglo-Saxon *sceadan*, to cut, and hence Mr. Blanford's mistake. But the English word *shed* means to flow off, and a *water-shed* is a flowing-off of water. A shed to shelter cattle has its name not from the ridge of the roof, but from the slope which sheds off the water. And so with a mountain, the water-shed is not the water-parting, or dividing ridge, but the slope down which the water flows from the ridge to the river in the valley below.

The Calcutta Reviewer's confused notions of geography have led him into the mistakes which I have pointed out. In reality, the Southern Himálayan Range is clearly defined by its numerous snowy peaks, which are the loftiest in the world. Behind it is the Central Himálayan Range; and the system is completed by the Karakorum and Gang-dis-ri Mountains, which I have called the Northern Range. The analogy between the Himálaya and Andes is exact as regards their three parallel cordilleras. The true difference between them is that in the Andean system the central cordillera nearly forms a complete water-parting, and the Maritime and Eastern Chains are cut through by numerous rivers; while in the Himálaya the complete water-parting is the northern or outer range, and rivers force their way through both the Central and Southern Ranges. Thus in the Andes the rivers flow off in two directions, to the Pacific and to the Amazon Valley, while the Himálaya drainage is all to the plains of India.

The Reviewer's geography is bad, but the general tenor and object of his article is even worse. He attacks the Introduction to the *Narrative of the Mission of George Bogle to Tibet*, because it advocates the renewal of free communication between Tibet and India, and his tactics are comprised in an elaborate and laborious attempt to discover any error, however trivial, on which to descant. As the re-opening of unfettered intercourse with Tibet is not only a matter of great geographical importance, but also a very useful measure in other respects, it is by no means undesirable that we should have an exhaustive statement of all that can be said against it. The Reviewer is a very promising recruit in the great and too powerful army of obstructives—a zealous student in the school which teaches "how not to do it." It is well, therefore, that we should consider all that can be said from his point of view.

He begins by finding fault with my Introduction on five grounds, namely, that there are repetitions in the foot notes; that there are frequent mistakes in fact; that it contains unreasonable assumptions in regard to questions involving doubt; that mine is an erroneous way of describing the configuration of the Himálaya; and that there are rash drawings in parts of the general map.

The first complaint, against repetitions in the foot notes, is an amusing little bit of hypercriticism. The Reviewer has found out that in more than one place I have explained that Demojong's country means Sikkim, and that Seling is Sining; and he devotes nearly a page to a dissertation on his ability to have remembered these explanations, if they had only been made once.

As regards the "frequent" mistakes in fact, he has, after an evidently most minute and diligent search, discovered ten oversights, most of which are mere errors of the press. I am extremely obliged to him for having taken this trouble, and such of the corrections as I had not previously noted, have come at a convenient moment, in time for insertion in my second edition. Meanwhile I now give them in a footnote, for the benefit of those among my readers who have got the first edition of the *Mission to Tibet.**

Some of his corrections are absurd. For instance, he finds fault with the word Gorkha being used, instead of Gorkhali. I explain the distinction between the two words in a note at p. 126, but it would be a ridiculous piece of pedantry to adopt the word Gorkhali, when Gorkha (see *Allen's India List*) is always used officially. Again, he objects to my footnote explaining that the Mutgari of Father Grueber is Motihari, a town then in the district of Sarun. Here his objection is that Motihari is not now in Sarun, but in Chumparun, referring to a very recent administrative subdivision. I was quite correct in describing Motihari as being in Sarun when Grueber wrote, and indeed until very recent years. Chumparun was a subdivision of Sarun, and the district is officially referred to as Sarun *and* Chumparun.

The alleged unreasonable assumptions in regard to questions involving doubt come next. The first appears to be that I intimate that Mr. Hodgson prevented a rupture with Nepal throughout the period of the Afghan war, a fact which is new to the Reviewer. Very likely, for the true history of the supersession contained in unpublished correspondence is not accessible to him; but the facts are, nevertheless, exactly as I have stated them. The Reviewer next takes exception to my suggestion that certain travellers who visited the Teshu Lama, and whom Mr. Bogle calls Kalmuks, were Manchurians; and he is pleased to call this an unfounded assumption. Whether it be so or not, it was made on the highest authority, and is consequently of more value than the Reviewer's crude conjectures about Eleuths, Torguts, and Torbots. Equally unfounded, he declares, is the assumption that the men who obstructed Mr. Bogle's mission were not the people, but the officials. This suggestion was also offered on the highest possible authority, and is in accordance with all subsequent experience.

I have already dealt fully with his lucubrations on the physical geography of the Himálaya, and his remarks on the map will be disposed of by Mr. Saunders in our next number; as a satisfactory discussion of the points raised will require a map for their illustration.

These criticisms, though occupying considerable space, are apart from the main intention of the review, which is to advocate a policy of inaction. But my Introduction must first be discredited. The wells must be poisoned. One instruction in this counsel's brief is to abuse the plaintiff's attorney, and this instruction is carried out to a wearisome extent before the main point is reached. Let us now hear what he has to say against the establishment of free communication between India and Tibet.

His theory is that the through trade with Tibet fully recovered itself about twenty-five years ago, and that in the nature of things it has not since increased, and never will increase, in any appreciable degree. He urges that Warren Hastings did not effect anything by his missions; but this is a mistake, for they were followed by the establishment of the fair at Rangpúr which promoted and increased the trade between Tibet and India. A policy opposed to that of Warren Hastings, a policy which is represented by the abolition of the Rangpúr fair, the petty frontier wars, the discouragement of exploring enterprise, and the sealing of the passes, has obliterated the good effects of the Trans-Himálayan missions. But the Reviewer's main contentions are that the trade with Tibet can never be of any value; while many of the passes are very difficult and devoid of resources. The passes are certainly difficult and devoid of resources, as are many of those in the Andes through which trade flows. It is on this account that I have dwelt on the importance of opening all the passes, and not confining the traffic to one route.

The wool of Tibet, he declares, could not compete with the Australian staple, on account of the cost of carriage, although it might be had in any quantity, but he gives no ground for this assertion. It is an "unfounded assumption," to use one of the Reviewer's phrases. It so happens that there is likely to be a large and special demand for the peculiar wool grown at high elevations, such as that of the Tibetan sheep; and if free communication was opened, the wool trade with Tibet would eventually become very important. In the same way, the immense demand for tea in Tibet will eventually find its supply from India. But the great question with the Reviewer is "how not to do it;" so the wool—the real wealth of Tibet—is disposed of as unable to compete with the Australian staple, while the working of Tibetan gold mines must be discouraged lest such an industry should "disturb the exchanges as much as the mines of Nevada are doing now!" Having thus summarily disposed of Tibetan trade, he next proceeds to defend the ruinous fiscal policy of Jung Bahadur, which has almost destroyed the commerce of Nepal, and the maintenance of an unnecessarily large Gorkha army, which eats up the resources of the State.

---

* Page vii. line 17—*For* 15th and 16th, *read* 17th and 18th.
,, xxxv. ,, 16—*For* Bhei *read* Behri.
,, xlv. ,, 16—Omit *each of.*
,, xlvii. ,, 4—*For* "was contemporary with Tsong-khapa having been born in 1339," *read* "is said to have received the spirit of Tsong-khapa in 1419."
,, xlvii. ,, 28—*After* Avalokiteswara *insert* (or Padma Pani).
,, xlvii. ,, 29—*For* Buddhisatwa, *read* Dhyani Buddha.
,, xcix. ,, 27—*For* K.C.B., *read* G.C.B.
,, cxii. ,, 2—*For* Depon, *read* Depen.
,, clviii. ,, 23—*For* 1811 *read* 1812.
,, clxxiv. *note*—*For* 13½ sicca, read 13½ Company's.

He finally points, with satisfaction and complacency, to the small results of the recently-opened trade between the Punjab and Eastern Turkistan, and regrets that he has not the figures to indicate at what outlay the alleged insignificant results have been obtained. The missions of Sir Douglas Forsyth were fruitful in valuable results of various kinds, which were well worth the expenditure. But the obstructives think differently, and this lively specimen of the class concludes with one of their favourite quotations "*Le jeu ne vaut pas la chandelle.*" And so a deaf ear is to be turned to the representations of the great manufacturing interests in Yorkshire, Lancashire, and Scotland, which are called by our sprightly Reviewer "the mercantile clique in the North of England."

Such is the case against the policy advocated in my Introduction to the *Narrative of Bogle's Mission to Tibet.* The obvious reply to it is that the eventual results of opening trade with Eastern Turkistan cannot be estimated by the returns of the first few years, and that the mischief done by obstructives of former ages will probably take a very long space of time to remedy. The same remark will, of course, apply to Tibet. When communication is made free it will necessarily be long before the traffic becomes considerable. But the inexhaustible supplies of wool and of the precious metals which Tibet can furnish will inevitably find their way down such channels as may be opened, first in small driblets, but eventually in a large and continuous stream. For commerce will create new wants, and as these increase the trade between the two countries will advance and prosper. Nor are the good effects of free communication confined to these commercial advantages. Still more important are the establishment of friendly relations, the interchanges of thought, and the extension of knowledge. The appearance of this article in the *Calcutta Review*, advocating as it does a policy of obstruction and inaction, is ominous; and it behoves those who are interested in the welfare and progress of India to exert all their influence to counteract a retrograde tendency which has thus found expression. An English mission from Peking to Lhasa might, by the display of a little firmness, be despatched with the consent of the Chinese Government; an enterprising and judicious English traveller could as easily explore the Tibetan plateau as the Russian Prejevalski; but the mischievous obstruction which prevents the adoption of permanently useful measures of this kind comes from powerful influences, and one of their manifestations is this article in the *Calcutta Review* on "Trans-Himálayan Missions and their Results."

Clements R. Markham.

GREGOR N. POTANIN'S JOURNEY THROUGH THE ALTAI MOUNTAINS.*

We only started from the Zaisan post on August 1st (new style), having been much delayed through the difficulty of procuring camels, most of these animals being then employed in carrying corn to Gacho. We reached Bulun-tokhoi in seventeen days, travelling along the new carriage road leading through the valley to the north of the Saur mountains. Bulun-tokhoi we found occupied by a sotnia of Russian Cossacks, who had taken up their quarters in a Chinese temple.

We left Bulun-tokhoi on August 20th. We followed the eastern shore of Ulyungur lake, crossed the deep and rapid Black Irtysh at Durbeljin in a ferry-boat, and on August 29th arrived on the banks of the Kran, near the rock, which gives its name to the Chinese town of Tulta, about twelve versts higher up. During the march we had suffered much from the heat and from flies. When we reached the Kran most of the vegetation was in its last stage, hoar-frosts had set in, and most of the corn had been harvested. The whole of the valley of the Kran, from the Phara-sumé monastery down to Balbagai, a distance of 10 or 15 versts is occupied by the fields of Eleuths and Kirghiz. It is the granary of the eastern Ektag Altai, and the Kirghiz, as far as Kobdo, come hither to purchase their corn. Poppies are likewise cultivated extensively, and much opium is exported to Kobdo and Bulun-tokhoi. On the day after our arrival, August 30th, we started for the monastery of Phara-sumé, distant about 10 versts, it being our intention to convey presents to the Tsagan-gygen, and to ask him for a guide. We were met, soon after our departure, by a body of men, who demanded that we should retrace our steps. Two officers intimated that it was too late to pay a visit to the Tsagan-gygen on that day, and advised us to return on the morrow, when they would conduct us over the town and the temple. We consented, but on the following day no conductors appeared, only a few Mongols showed themselves, and they positively declined to take us to any of the officials The authorities of the Chinese town, it appears, had instructed the people to act in this manner, and all the answer we could get to our inquiries was "*ayjur*"—be off! We decided at length to start for the monastery and the Chinese town near it without a guide, and to pray the monks to grant us one. On approaching the largest of the temples, not yet completed, we found ourselves surrounded by a body of powerful-looking monks, who ordered us to dismount from our horses. We were taken to a small square of the town, and, after having been kept waiting there for two hours, an officer of police made his appearance and declared that he could not allow us to proceed until we had exhibited our passports. As these were with the caravan we were obliged to submit to being confined in the house of a lama during the night. Our host was very loquacious. He placed before us tea and mutton, of which he declined to partake himself, as he declared we were being entertained at the expense of the Bogdo Khan. On the following day, September 1st, we had to appear before a Mongol official—our interpreter said he was governor of the town. He sat on a bench in a small room; a little table stood near him, and upon it we saw our passports. Four soldiers in yellow jackets were at his side. We were accused of having entered a peaceable town with arms, and of having committed sacrilege by approaching a temple. We complained of not having been met by the local authorities. Our interlocutor asserted that they had only heard of our presence after we had approached the temple, and knew nothing about the officials whom we claimed to have met on the evening of August 30th. The authorities evidently desired to settle this business in a peaceable manner, and we were given to understand that on our saying no more about this incident we should be granted the support of the Tsagan-gygen. We declared, however, that we should not fail to inform our Government of what had happened. The governor then asserted that our passports only authorised us to proceed to Kobdo by the road of pickets. We declined to accept this interpretation, Our passports were then restored to us, and we were told that the authorities declined all responsibility for what might happen during our journey.

---

* Izv. XII., pp. 427 and 501.

Whilst staying in the valley of the Kran, the Kirghiz came down from the mountain-pastures, and we succeeded in obtaining fresh camels and horses in the aul of a Kirghiz trader, Jurtnai. The road up the narrow forest valley of Kandagatai was steep and difficult. The accounts which we heard of the difficulty of crossing the Jamaty Pass at the head of the Black Irtysh, and the approach of the rainy season, induced us to cross the Altai by a more southerly pass, the Urmogaity, which is near the source of the Kran, and has a height of 9000 feet. We did not meet with snow, but during the winter snow lies to a considerable depth on the western slope of the mountains, putting a stop to all communications, and compelling travellers to follow the picket-road in the Bungan Valley when desirous of proceeding from Bulun-tokhoi to Kobdo. During our journey from the source of the Kandagatai to the Urmogaity it snowed frequently, but no snow at all was met with on the eastern slope of the Altai. In fact, precipitation is more abundant on the southern slopes. This accounts for the forests of pines and larches met with in the valleys there, and the barrenness of the eastern slope. At the eastern foot of the Urmogaity Pass we came upon the Dann-Kul, an alpine lake giving rise to the Kutan, which falls into the river of Kobdo. On this lake we met with Kise Kirghiz, who had crossed the Altai seven years ago, and spread eastwards along the valley of Kobdo and its tributaries. The last Kirghiz were met with on the Tal-nor, about three or four days' journey from the town of Kobdo. The country to the east of the Urmogaity resembles a hilly table-land, and abounds in lakes. To the east the plateau descends in terraces, separated from each other by mountain-ranges. The last of these ranges runs north and south, and separates the terrace of the Dyaliun River (a tributary of the Buyantu) from the trough-shaped valley in which lies the town of Kobdo. We crossed this range in the Terekty-asu Pass (10,000 feet), descended its eastern slope to the Buyantu River, and reached Kobdo on the 16th October.

Our collection of plants contains up to the present only specimens from the Ulyungur basin, as the Alpine flora of the southern Altai was already withered when we reached there. Of birds about 340 specimens were procured. We also collected mineralogical specimens. A route survey has been made, three latitudes and numerous altitudes have been determined, the latter barometrically. At Kobdo we met several Russian merchants, who had come there from Barkul.

(Potanin spent the winter at Kobdo.)

THE NAVIGATION OF SMITH SOUND AS A ROUTE TOWARDS THE POLE.*

My present paper on the navigation of Smith Sound will, I trust, be accepted as a continuation of the one on the Polar area, which I recently had the honour of reading before this Society, rather than as being an exhaustive description of the locality.

Our knowledge of the water-passage leading from Baffin Bay into the Polar Ocean is derived from observations made by explorers who have passed eleven summers and six winters in the neighbourhood.

Of the four expeditions specially equipped for the exploration of Smith Sound, three were despatched from the United States and one from this country.

In 1852, the present Admiral Inglefield visited the entrance of the Sound, and discovered the south shore of Grinnell Land; also that the coast of Greenland, north of Cape Alexander, trended to the north-east for a considerable distance, but he did not land on either shore.

In 1853, Dr. Kane, with his small sailing-vessel, was the first who succeeded in forcing a passage within the sea; but, after a most determined and spirited struggle, he was finally imprisoned by the ice in Rensselaer Bay for two winters. From thence one of his sledge-parties, under Morton, explored the Greenland shores to Cape Constitution; and another, under Dr. Hayes, landed on Grinnell Land; both journeys displaying the very highest qualities in all engaged in them.

He was followed in 1860 by Dr. Hayes, who, unable in his sailing-schooner to enter the sea, was forced to winter in Port Foulke. In the following spring, after a most harassing and determined march across the heavy polar pack in Kane Sea—over which he found it impossible to drag his boat—he ascended Kennedy Channel; making one of the most brilliant Arctic sledge-journeys on record.

In 1871, Captain Hall, in a small steam-vessel, made his most successful run to the head of Robeson Channel, where he was stopped by ice, and forced to winter in Polaris Bay. From thence, sledge-parties explored to the northward of Newman Bay; but, like all previous travellers, except Sir Edward Parry, they were unable to drag their boats over the rough ice. On her return voyage, the 'Polaris' was caught in the pack and driven into Lifeboat Cove, where she was obliged to be run on shore.

In 1875, the most powerful Expedition of all, consisting of two steam vessels admirably equipped, was sent out from this country under my command. We succeeded in reaching the head of Robeson Channel, where we were stopped by the ice, and passed the winter on the west shore of the channel.

---

* Read at a meeting of the Royal Geographical Society, by Sir G. S. Nares, K.C.B., March 26th, 1877.
See map of Smith Sound in our number for January last.

Sledge parties explored the whole of the neighbouring shores, and determined the existence of an extensive sea; but, like all our predecessors, we were unable to transport navigable boats for any great distance across the ice, away from the land, during the short season when exploration by means of sledging is possible.

As experience shows that, in all but very exceptional seasons, the position can be yearly visited from the southward, the neighbourhood forms a valuable and important base for exploration in more northern latitudes. It is, in fact, the most northerly position, where an abundance of game is procurable by experienced hunters within a restricted area. At no other northern position yet explored is game now to be obtained in sufficient quantities to enable even a party of Eskimo to exist throughout the year on their own resources.

On the opposite coast of Ellesmere Land, on the west side of the channel, the country in the interior is not so completely buried in ice, and the mountain tops all project above the ice-cap.

South of Cape Sabine, however, the glaciers on the hill-sides extend into the sea, and so few bare places are left fit for feeding grounds. To the north of Cape Sabine, along the southern shores of Hayes Sound, the line of perpetual snow and ice—as on the Greenland coast—is at a considerable height above the sea-level; consequently the glaciers, instead of extending to the sea, are fronted by vegetated valleys and heights free from ice.

One spot partially explored by the late Expedition—Twin Glacier Valley and the heights about Alexandra Haven—exhibited many recent traces of Arctic life; and the numerous ancient Eskimo remains found there would denote that game had always frequented the neighbourhood.

An exploring party travelling up Hayes Sound, on the interesting duty of ascertaining whether a water-passage exists extending to the Western Sea, may therefore expect to obtain a small supply of fresh food on the south coast of Grinnell Land. North of Hayes Sound, the mountains are remarkably free of any ice-cap; the valleys contain small glaciers; but extensive tracts of land are free from snow during the short summer, yet the locality is decidedly unfavoured by game. While our ships were detained by the ice near the coast, only a few hares and ptarmigan were obtained. Sledge-travellers will be unusually fortunate if they there obtain any game at all.

In Rawlings Bay, at the south entrance to Kennedy Channel, a few ancient decayed musk-ox bones were found; but I think that few of these animals wander so far away from the more favoured grazing grounds in the large valleys near Mount Grant, in the United States Range. As we advance to the northward, up Kennedy Channel, the sea-life rapidly diminishes, and the bears who prey upon it are found in ever-decreasing numbers. At Polaris Bay, where the winds and currents contribute to keep the water-spaces more open than elsewhere, a few seals and sea-birds congregate during the summer. North of Robeson Channel, few, even of these are met with, and the bears are quite left behind.

The coast of Greenland, bordering these seas, so far as can be sighted from the sea, lies completely imbedded in ice—in summer as well as in winter—without one mountain peak showing itself above the very slightly inclined skyline of perpetual ice.

The glaciers descending from this ice-cap are, however, mostly melted before reaching the coast, leaving a border of land clear of ice near the sea.

Hartstene Bay, situated at the head of Baffin Bay, on the Greenland shore, is washed by a warm current coming from the southward; and is protected from the cold Arctic flow by the projecting promontories, which form the western capes of Greenland. In consequence, the neighbourhood, as first pointed out by Dr. Hayes, enjoys a comparatively mild climate; and on the vegetated lands fronting the ice-cap, as well as in the neighbouring sea, Arctic life is found in its greatest abundance.

Throughout the whole area north of Smith Sound the migratory birds in small numbers rear their young in the favoured valleys and plains during the short summer.

The nearer we approach the Pole, the later in the season does the sun make its appearance, and the lower the altitude it attains at noon. Consequently, the spring and the reanimation of the non-migratory Arctic life are more backward.

At the Pole, the birds can have very little time to spare between the late spring and the returning autumn frosts in which to rear their young. So pressed are they for time that, as I have already related, many that visited Floeberg Beach, finding the season more backward than they anticipated, were obliged to return to a more favoured locality farther south. Thus I reason, that as we advance to the northward, less dependence can be placed on obtaining an appreciable supply of winged fowl.

With regard to migratory birds in high northern latitudes, it is remarkable that the men of our party who resided at Polaris Bay during July and August, the best season for game, and who were extremely anxious to obtain a supply for the use of their sick comrades, were unable to find birds in as great numbers as the crew of the 'Polaris' had found them at the same place. And I cannot but conclude that the birds resort yearly to the same locality for the purpose of breeding, and that when they are all shot down in any one neighbourhood, it takes some years before that neighbourhood becomes fully stocked with game again. This opens up the question as to whether the large number of necessarily ruthless sportsmen who last year hunted the district between Lady Franklin Sound and Cape Joseph Henry have not for a time devastated that district by destroying all the parent birds.

The same consideration will apply to musk-oxen; for Hans, the Eskimo, who was the most successful hunter on board the 'Polaris,' in 1872, could find none of these animals on the same feeding-grounds in 1876.

It will be convenient if we consider the district under discussion as consisting of two narrow channels, Robeson and Kennedy Channels; and two broadened parts or seas, Hall Basin and Kane Sea, with Smith Sound or Strait as an outlet into Baffin Bay. During the navigable season, that is during August and the first week of September, after the ice has broken up, and is drifting about at the mercy of the winds and currents, in consequence of the prevailing winds coming from the westward and the ocean current from the northward, the shores of the channels and seas having a north-westerly aspect are more liable to be encumbered with ice for long periods than those with a southerly or easterly one. This consideration, coupled with the knowledge that Dr. Kane, although working with remarkable patience and perseverance, was unable to force his way beyond Rensselaer Bay, on the south-east shore of Kane Sea, and was imprisoned there the following season, owing to the ice in the neighbourhood never permitting him to move, determined me, both when going north and returning, to keep on the western shores as much as possible.

In a channel of varying breadth, owing to the strength of the winds, tides, and ocean-currents being greater in the contracted than in the broad channels, the ice is more readily carried away out of the narrows and deposited in the more sluggish waters of the broadened parts.

Thus, in Kennedy Channel, there is comparatively a free navigation throughout the summer; while in Kane Sea there is a great accumulation of ice, with a constant influx at the north end, and a discharge into Baffin Bay at the southern entrance. At the latter point, where the ice is first met with when coming from the southward, as the current runs strongest in the offing than inshore, the southern edge of the ice, extending across from Cape Sabine towards Littleton Island, assumes a horse-shoe shape, curving to the northward, with a water-space in mid-channel, from whence the ice is readily carried to the southward. Thus, vessels arriving from Baffin Bay are usually able to penetrate for a short distance farther north in this bight than they can do by keeping among the more closely-packed ice inshore; but they are sure, sooner or later, to meet the edge of the main pack-ice in Kane Sea. It can only be in very rare seasons that the water-bights can extend so far north as to communicate with the more open sea in Kennedy Channel. Once up to the edge of the ice, a never-ceasing battle commences between the voyagers and the elements; no one moment can be lost, and there is little limit to the risk which has to be run. Dangers elsewhere have given rise to the saying, "There's a sweet little cherub that sits up aloft to look out for the life of poor Jack." I know of no place where it can be used more appropriately than in connection with navigation through heavy ice.

It is a mistake to suppose than the 'Polaris' did not encounter ice in this part as she ran to the northward. From a position near Littleton Island, she steered a direct course for Cape Fraser; but found that she was running into a bight in the ice. Captain Hall then turned to the south-west, and, rounding the edge of the pack, passed up to the northward close along the western shore, through a water-channel existing between the pack and the land, in the same manner as the 'Alert' and the 'Discovery' did; the only difference being that while we had to fight for every mile, the 'Polaris' fortunately found a continuous channel, probably owing to a previous westerly wind.

In Hall Basin there is an accumulation of ice similar to that in Kane Sea, with a few open water spaces in the narrowest part of Robeson Channel. But the large stores of ice in the Polar Sea to the northward, and in Lady Franklin Sound to the westward, readily movable by the prevailing wind, renders the navigation of this part of the channel even more difficult and dangerous than in the larger but somewhat similar Kennedy Channel. In conducting a vessel to the northward, the greatest difficulties may be looked for when passing along the shores where the pressure of the current sets against the land. This is particularly the case near the southern exit to the two broad seas, Hall Basin and Kane Sea. Happily both are furnished with good and convenient harbours.

Cape Sabine, a difficult point to pass, has Port Payer most advantageously situated for use as a resting station, while waiting for a westerly wind to blow the ice out of Hayes Sound, and open a passage to Victoria Head and to Grinnell Land. If stopped on the way by the ice, the grounded icebergs in the indentations on the east side of Bache Island will afford a slight amount of protection; but, after leaving Port Payer, Norman Lockyer Island and Walrus Shoal are the only secure resting-places until Bessels Bay or Discovery Bay is reached; both of which are valuable harbours, although the former is rather encumbered by icebergs.

The open bays on the south-east coast of Grinnell Land, owing to their large size, afford very little protection to a ship. In the early season they are generally filled with one season's ice of ordinary thickness, in which a dock may be cut when the ship is compelled to wait; but by the middle of August, the height of the navigable season, this bay-ice has generally broken up and drifted out, giving place, when the wind blows on shore, to the heavy Polar ice from the main channel.

Wherever large icebergs have grounded in clusters near the land—as is the case inside Washington Irving Island, north of Hayes Point, and in Joiner Bay—if the ice inshore of them has broken up and drifted out of the way, they often afford convenient protection from immediate danger when the outer ice closes in. At other parts, such as Maury Bay, small ones become stranded, and are useful as fixed stations to which the ship may be temporarily secured; but if the outer ice closes in with force, both the ship and iceberg or floeberg, whichever it might be, would be forced upon the shore. With this consideration, a light draught of water is of the utmost importance in an Arctic vessel.

North of Baffin Bay, ice-saws are only of use when meeting with the one season's icefloes of from 3 to 6 feet in thickness, which have been formed in the bays during the previous winter. The usual saw is far too short to make any impression on the thick ice found in the main channel, most of which has drifted to the southward out of the Polar Ocean.

Also, as steamers are called upon to navigate through very close ice and channels only as broad as themselves, there is very little time given to think of docking. The greatest judgment is required by whoever is in command; and the danger of the ice nipping together must be somewhat disregarded, if any advance at all is desired. Icebergs form an important feature in the navigation. To the northward of Cape Sabine, the only discharging glaciers are those in Dobbin Bay and Rawlings Bay on the Grinnell shore; and Peabody Bay and Bessels Bay on the Greenland coast.

The icebergs broken off from the front of the discharging glacier which completely fills up Petermann Fiord are so small, that they cannot be considered as in any way affecting the navigation of the district. In Robeson Channel, and in the Polar Ocean to the northward immediately in its neighbourhood, there are no icebergs. Of those which escape out of Bessel Bay, a few drift towards the north, and become stranded in Polaris Bay, where one sheltered the 'Polaris' during her winter stay. The greater number drift at once to the southward, through Kennedy Channel, without grounding, owing to the depth of the water and the strength of the current. There are few icebergs met with in mid-channel north of latitude 80° N. South of Rawlings Bay, where the channel expands into Kane Sea, they become stranded, and stud the shores on both sides. A navigator passing a cluster of these carefully notices the amount of protection it would be capable of affording, were he forced to retreat by the ice closing in ahead.

Kane Sea is thickly studded with floating icebergs. All the large ones derive their birth from the Humboldt Glacier, and their drift readily marks the general movement of the ice. From the high land about Cape Louis Napoleon, 2000 feet above the sea, the heavy chain of the bergs in Peabody Bay fronting the Humboldt Glacier—through which Morton from Dr. Kane's vessel had such difficulty in advancing when making his splendid journey to the north—is distinctly visible at about 50 miles' distance. A few of these drift across to the western shore, but the majority are carried to the southward on the east side of the channel. On all occasions those which are driven into the offing indicate the faster drift of the main body of the ice in mid-channel compared with that nearer the shore. This is also well shown by the drift of the 'Polaris.' Caught by the pack and borne onward by the full strength of this current, she drifted from the south entrance of Kennedy Channel, in an almost direct line, to the neighbourhood of Littleton Island—between the middle of August and October—a distance of 120 miles in sixty days. Her drift also shows that, although all regular navigation is over for the season by the middle of September, the ice is not firmly frozen before October or November; but after the latter month all motion ceases except in the very narrow channels.

A strong current, even when the temperature of the water is very low, is a powerful agent in retarding the formation of ice, and in preventing ice once formed from increasing in thickness as fast as it would if the water were stationary. It also decays and destroys the ice before the power of the sun is able to make itself felt.

In Bellot Strait, leading westward out of Prince Regent's Inlet, where the tide runs with great rapidity, Sir Leopold McClintock informs us that the water remains unfrozen throughout the winter. In other narrow channels the ice only attains a minimum thickness, even during the coldest weather. Early in the spring, long before the temperature rises above the freezing-point, the ice in the narrows decays and *polynias* are formed, surrounded by fixed firm ice.

I therefore reason that because Robeson Channel was open nearly all the winter of 1871-72, it does not necessarily follow that the ice in the Arctic Sea was also in motion; and yet I cannot take upon myself the responsibility of suggesting that the ice in that sea always remains unbroken as late in the season as it did last spring, that is until the middle of July. Were we perfectly certain that the ice in the Polar Ocean always remains stationary until even the end of June, sledges unprovided with boats might be despatched, and the possibility of reaching a higher latitude would then be very considerably increased.

THE MORAL SCURVY.

II.

THERE is a decided improvement this month, and the only new patient with scorbutic symptoms is a writer in the *United Service Gazette* of April 14th, 1877. He is rather bad, for he will not take his lime-juice, protesting emphatically against the cure that we must nevertheless apply. He says: "We must emphatically protest against such articles as that on 'Moral Scurvy,' which appears in a periodical edited by an 'Old Arctic.' who has done much to bring the late Expedition into disrepute, by adopting a course which all concerned must heartily endorse as realising the truth of the maxim, 'Save us from our friends!'"

In other words the moral scurvy is to be allowed to spread unchecked. Mis-statements, false insinuations, and unjust accusations are to be sown broadcast, and no word is to be spoken in defence. It is not by maintaining the right and speaking truth that the Arctic Expedition can be brought into disrepute; and we shall take care that no attempt to misrepresent its proceedings or to suggest imaginary shortcomings remains unexposed.

We believe, however, that much of this deplorable misrepresentation is made in good faith, and that it is due, almost entirely, to the unscrupulous assertions of the *Sanitary Record*, which have been accepted without due inquiry and investigation.

Our present patient insinuates that there was no systematic training of officers and men for the sledging campaign in the spring. He is mistaken. As in former expeditions, so in that of 1876, the sledge crews and officers were regularly, and for the last fortnight daily exercised and trained for the work. His next insinuation is that the weights were excessive. This is equally devoid of foundation in fact. The greatest weight per man on leaving the ship, 236 lbs. for the northern division, was considerably less than that adopted by McClintock in 1853, and was not excessive. McClintock's weight per man, on leaving the first depôt, was 253 lbs. Parry's weight per man, in his attempt to reach the Pole, was 268 lbs. Equally groundless is the assertion that there was an undue allowance of spirits. The sledge dietary of 1876 actually differed from all those of former expeditions in the fact that the allowance of spirits was reduced by one-half.

We have reserved for the last the most unfounded charge of all, contained in the following sentence:—"The best fitted-out expedition that ever left these shores had its success marred by neglect of attention to the most ordinary sanitary and prophylactic rules." The expedition was not the best fitted-out that ever left these shores, it was not unsuccessful, and there was no neglect of ordinary sanitary and prophylactic rules. The expedition laboured under some special disadvantages as compared with former expeditions, particularly in not being fitted with a warming apparatus and other conveniences which were so conducive to health and comfort on board the 'Assistance' and 'Resolute' in 1850-51; and in being supplied with salt beef of very bad quality; while in no one respect was it better fitted out than the expeditions commanded by Austin and Belcher. We need only refer our readers to the articles in our numbers for December 1876 (page 312), and January 1877 (page 1), for proofs that the expedition was not unsuccessful. As for the charge of neglect of sanitary rules, it is without any justification. The closest attention was paid to all the sanitary regulations which experience had shown to be useful, and which were established by the precedents of former expeditions.

The editor of a publication, which he calls *Truth!* in his number for April 19th, 1877 (p. 485), returns to his fruitless work of misrepresentation. We are again treated to the usual virulent abuse, including imputations of "mismanagement," "incompetence," "disasrtous failure," and the like, and with the positive assertion that our "*opinion, publicly expressed, is that lime-juice is not an anti-scorbutic, and that its use is not necessary either at sea or on extended sledging parties.*" It will be charitable to suppose that this assertion is intended as a joke, though it is a very dull one. It certainly is not *truth.*

The best anti-scorbutic is generally believed to be fresh vegetables, and the best substitute for them is lime-juice; but we have pointed out that lime-juice alone is not sufficient entirely to prevent scurvy (see our number for January 1877, p. 4 and p. 16). We have also shown that in the late expedition lime-juice was properly administered to every soul on board both ships, every day, with the utmost regularity; and, we may add, that much greater care was taken on this point than was the case in several previous expeditions. We have explained that the outbreak of scurvy in the sledge parties was not due to the want of daily rations of lime-juice for two reasons. One is that lime-juice was never before used as a daily ration for sledge parties which did not suffer from scurvy: the other is that a sledge party of 1876, which started when the weather was warmer, and which, therefore, had daily rations of lime-juice, did suffer from scurvy. We have shown that Captain Nares was justified in not loading the sledges with frozen lime-juice in bottles, during April, because, as every one knows who has travelled in the Arctic Regions in that month, it could not have been used. He followed the best former precedents, established by McClintock, McClure, Collinson, Osborn, Ommanney, Hamilton, Rae, Hayes, Payer, and others, none of whom ever took lime-juice as a daily ration for their sledge parties. If lime-juice can be supplied in the form of lozenges, biscuit, or in any form in which it can be used, we shall be among the first to advocate its adoption as part of the daily ration in April sledge-travelling.

As regards lime-juice the late expedition presents an exactly parallel case to former expeditions which escaped the scurvy. Consequently, the cause of the outbreak must be sought for in some difference between the cases, and we have pointed out what that difference was in our number for January 1877, p. 4.

RETIREMENT OF COLONEL T. G. MONTGOMERIE, R.E., F.R.S.

The Department of the Great Trigonometrical Survey of India has suffered serious loss by the retirement of its senior Deputy Superintendent, Colonel T. G. Montgomerie, R.E., F.R.S. The following account of his services is given in the Report for 1875-76:—

"Lieutenant Montgomerie entered the Department in October, 1852. Soon afterwards he was present at the Base-lines of Chach and Karachi, in both of which measurements he took a leading share. In 1855 he commenced the topographical survey of the dominions of his Highness the Maharajah of Kashmir, which he finished within the next nine years. The scale adopted was varied from 2 to 8 miles per inch, the area amounts to some 20 square degrees or about 77,000 square miles, which include the stupendous mountain ranges of Kárákuram, Chángchenmo, Bárálácha, Muztagh, &c.; the chief towns fixed were Jummoo, Srinagar, Leh, Skardo, Hanle, Muzaffrabad, Kishtwár, Badrawár, Bárámúla, Dras, Bij, Behára, Nanshahra, Rajauri, Kargil, &c.; the principal rivers traced were the Indus, Jhelum, Chenab, Zánskar, Shyok, Kishanganga, Astor, Karakash, &c.; and of snowy peaks (rising from 16,000 feet to the culminating height of 28,250 feet of the peak at the north-east head of the Baltoro Glacier) may be mentioned Nanga-Parbat, Haramukh, Harámosh, Rákipúshi, Ser Mer, Kárákuram, Bárálácha, &c.; the area of glaciers in this region extended over more than 1400 square miles, and the heights ascended surpassed those recorded up to that time as reached by men unaided by balloons. Lieutenant Montgomerie's name will long continue to be most honourably associated with these operations, which for magnitude, merit, and importance are unsurpassed.

Returning, in 1866, from an absence on furlough for two years, Captain Montgomerie directed the survey of Kumaun and Garhwál with much success. As regards local surveys, those of Mussooree, Kosi Valley and Ranikhet were conducted by him, the last presenting an instance of uncommon dispatch, as it was begun in January 1870, and its eleven maps stood published in the following November. Lastly, he superintended the Trans-Himalayan explorations which have contributed so largely to our knowledge of countries that before were almost unknown. It is exceedingly difficult to give an idea of the provinces thus pierced or circumscribed; a brief attempt is however made in the following descriptions of the routes traversed. From Kumaun northwards to the sources of the Sutlej and Indus, and along a great length of the Brahmaputra eastward through Great Tibet to Lhasa. From Darjeeling westward to Kathmandu, thence over the Dingri Maidan to Shigatze in Great Tibet, onwards in a north-west direction round the Tengri-Nur Lake, and then southwards to Lhasa. From Kabul, *viâ* Bámián and Balkh to Faizabad and Kila Panjah, thence onwards through the Pamirs to Yarkand and Kashghar in Eastern Turkestan and so back to the Karakuram Pass. From Balkh, near the Oxus, to Karshi and Bokhara. From Peshawar to Dir, Chitral, and Zebak, in Badakshán, &c. These routes represent a total length of fully 4500 miles, along which our geographical knowledge has been substantially established.

Lastly, Colonel Montgomerie officiated as Superintendent of the Topographical Survey for a while, and as Superintendent of the Great Trigonometrical Survey for two years; in addition, his services have repeatedly been honourably mentioned by the Secretary of State, and by the Government of India. Nor are distinctions at home wanting, for he is a Gold Medallist of the Royal Geographical Society, as well as a Fellow of the Royal Society. His distinguished services in this Department will be long remembered in connection with his works, and many kind wishes from those with whom he was here associated, will continue to follow him in his retirement."

MR. STANLEY'S MAPS.

We reproduce from the *Daily Telegraph* the maps which have been received from Mr. Stanley. The first represents what he observed and heard respecting the Lukuga outlet of Lake Tanganyika, which was discovered by Commander Cameron, (see our number for March, 1875, p. 72), on May 3rd, 1874. Mr. Stanley went about five miles beyond the point reached by Cameron, and his therory is that the Lukuga is not yet an outlet, but that it will soon become one. We inserted an extract from the *Daily Telegraph* containing all that Mr. Stanley tells us respecting the Lukuga, in our last number (p. 106); and our existing knowledge points to the conclusion that there is a continuous channel bed from the lake to the Luindi River which flows into the Lualaba; but that it is generally dry in Stanley's Mitwansi tract, and that there is only an outflow from the lake at intervals of several years.

The second map refers to the basin of the Kitangulé River which was discovered by Captain Speke in 1861, and which drains the kingdom of Karague, Rumanika's country. Speke discovered a lake, which he called the Little Windermere Lake, and the Ingezi and Luchuro rivers, and he found that all these combined to form the Kitangulé River. He navigated the Little Windermere and found that it communicated with the Ingezi. The valley of the Ingezi was very extensive, and several feet deep in water, resembling a lake grown over with the tall papyrus-rush. He also saw the Luchuro Valley, and that the water in it was of the same nature as the Ingezi, but somewhat larger, being navigable as far as Ruanda. During Speke's six week's residence at the capital of Karague he saw the Mfumbiro cones in Ruanda, and ascertained the existence of a lake called Akenyara, belonging to the Kitangulé system. Captain Speke crossed the river Kitangulé on the 16th of January, 1862. Mr. Stanley reached the capital of Rumanika, the chief of Karagué, in March, 1876. He gives the name of Kagera to the Kitangulé of Speke, and reports that the Ingezi is a series of lagoons and reed-covered waters connected with each other, which is just what Speke describes it to be. In continuing his journey to the south, Stanley reports having come in sight of Speke's lake Akenyara, to which he gave the name of Alexandra Nyanza. See also our number for September, 1876 (p. 246).

Reviews.

—:o:—

BRITISH GUIANA.*

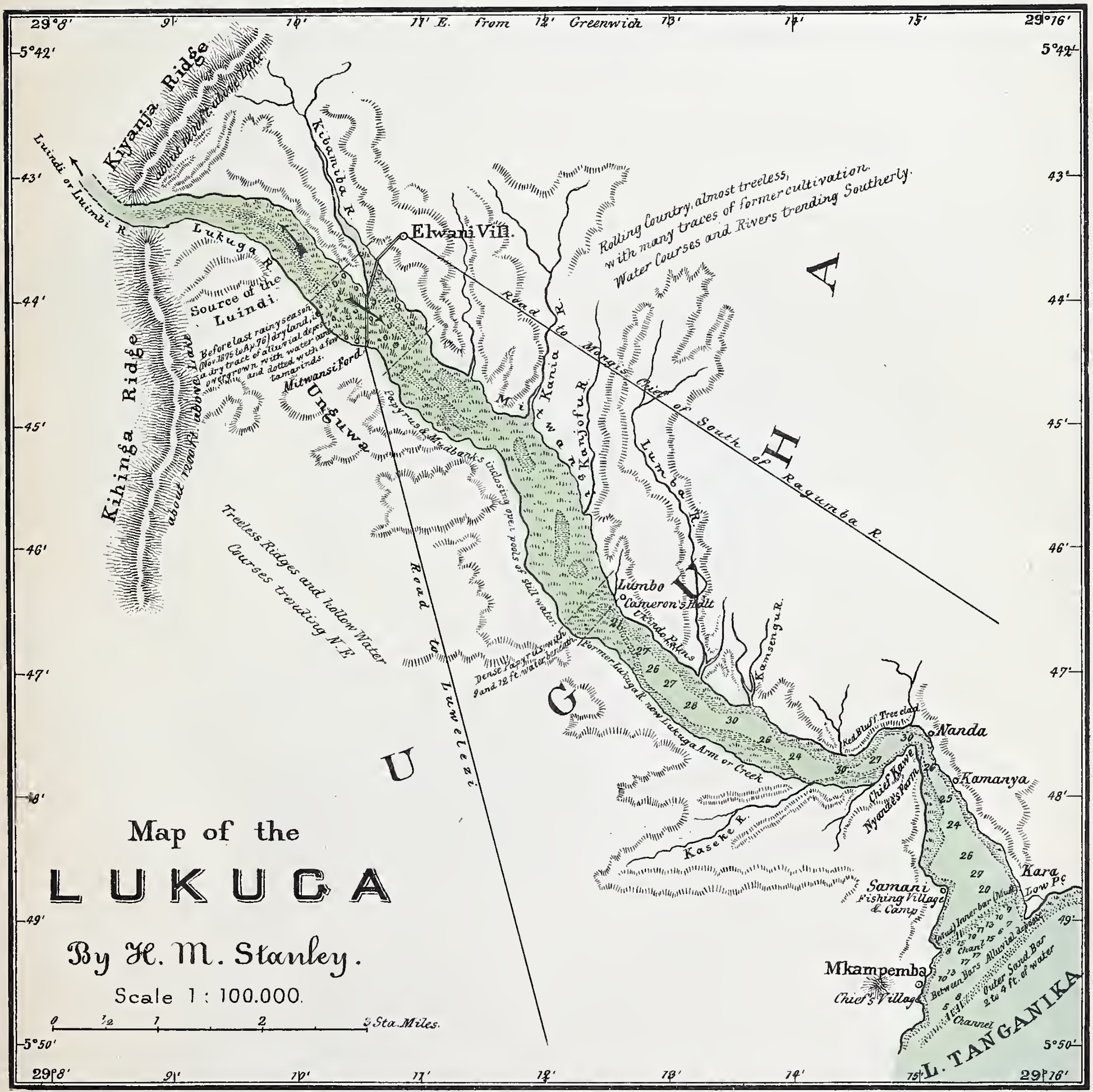
British Guiana, our only colony on the mainland of South America, forms a part of that great territory which had such a mysterious influence over Sir Walter Raleigh; and, except a narrow strip along the coast and a few settlements on the three principal rivers, it remains in the same state as it was in his time. The interior consists first of vast forests and then of savannas and mountains rising to the watershed which marks the boundary between the colony and Brazil.

The late Sir Robert Schomburgk tells us that "Few countries on the surface of the globe can be compared with Guiana for vigour and luxuriance of vegetation. A constant summer prevails; and the fertility of the soil, the humid climate, and congenial temperature ensure a succession of flowers and fruits. The dense and almost impenetrable forest of the interior offers inexhaustible treasures, not only for ship-building and architecture in all its branches, but likewise for the manufacture of furniture, and for many other purposes, that minister to the restoration of health or to the comfort and luxury of man." The country is admirably watered by a multitude of rivers, and the climate does not appear unhealthy: from Mr. Brown's account, fevers, indeed, are common, but not of a very severe type. The time must come when the resources of this colony will be developed; in the meantime it forms a paradise for adventurers and naturalists. The wonder is that the charm it had for Waterton has not been communicated through the *Wanderings* to many more; few countries so fresh, present so few risks. The Indians are friendly and hospitable; and if the traveller can overcome his disgust to such pests as ticks and jiggers, he may easily avoid danger from larger enemies such as pumas, jaguars, and snakes.

Mr. Barrington Brown filled the office of Government Surveyor in British Guiana from 1868 to 1872, and in that capacity explored the colony in a very thorough manner, ascending or descending all the principal rivers, and traversing much of the country that lies between them. In four years and a quarter he made no less than nine distinct journeys, and he surveyed much of the country which had been very imperfectly laid down before, and some which was positively unexplored. His reports to the Government on the physical features and descriptive geology of the colony have already been published. In the present work he gives a pleasant account of his journeys, and the adventures he met with, together with much information on the habits of the Indian tribes, and observations on the zoology of the interior. These observations appear to us of special value, and it is clear that there is still in Guiana a wide field open for discovery. Much has yet to be observed and learned on the habits of the various *felidæ*, which are there comprehended under the general name of tiger, and it is possible that there are still fresh

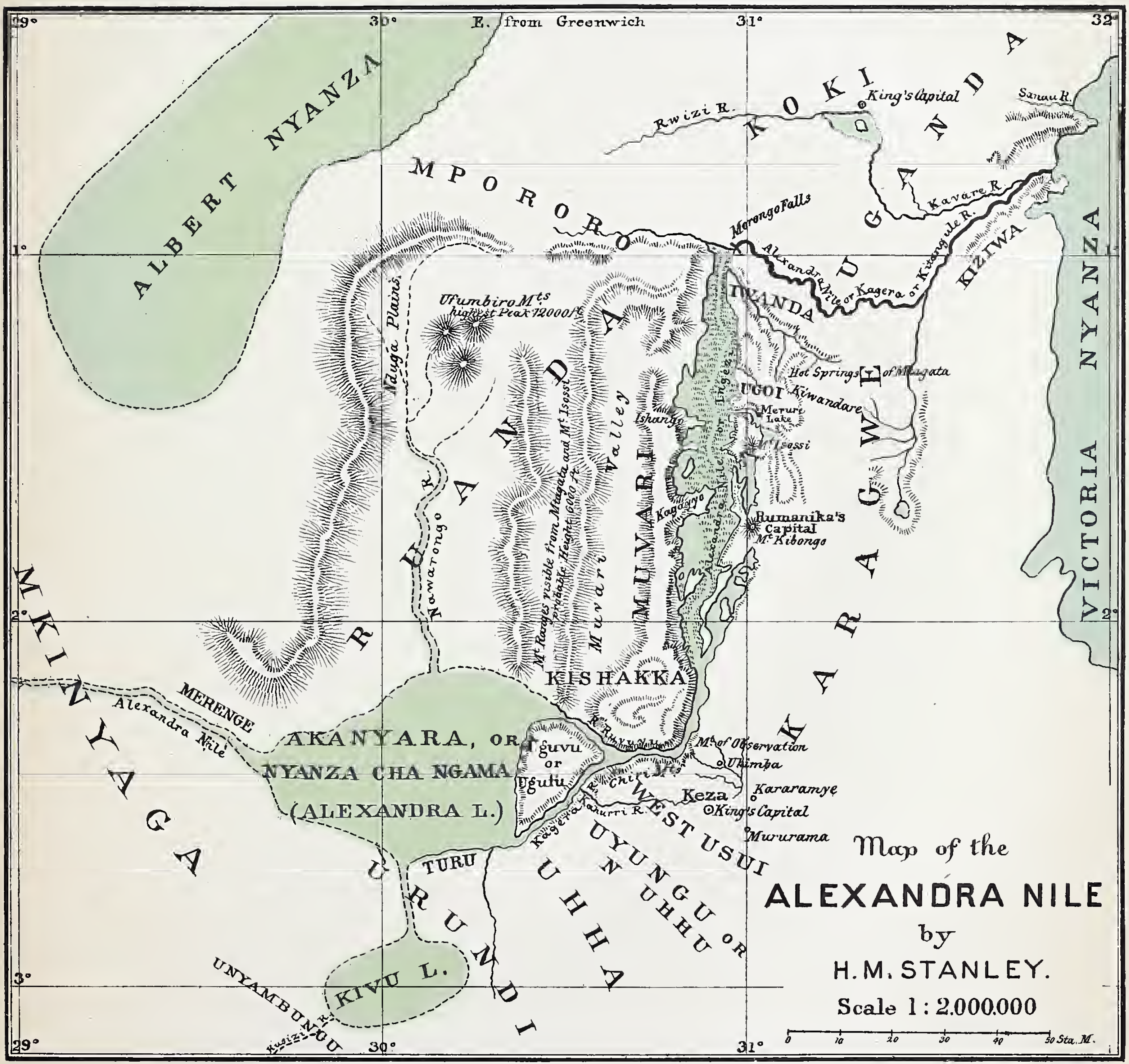
---

* *Canoe and Camp Life in British Guiana*, by C. Barrington Brown, Assoc. R.S.M., late Government Surveyor in British Guiana. With maps and illustrations. (Stanford, 1877.)


29°8'
9'
10'
11' E. from 12' Greenwich 13'
14'
15'
29°16'
5°42'
43'
44'
45'
46'
47'
48'
49'
5°50'
Kiyanja Ridge
about 1800 ft. above Lake
Luindi or Luimbi R.
Lukuga R.
Kihinga Ridge
about 1200 ft. above Lake
Source of the Luindi.
Before last rainy season (Nov. 1875 to Ap. 76) dry land, i.e. a dry tract of alluvial deposit overgrown with water cane and dotted with a few tamarinds.
Mitwansi Ford
Unguwa
Kibamiba R.
Elwani Vill.
Road to Mongo's, Chief of South of Ragumba R.
Rolling Country, almost treeless, with many traces of former cultivation. Water Courses and Rivers trending Southerly.
A
H
Mi Kania R.
Kanjofu R.
Lumba R.
Papyrus & Mabanks inclosing open pools of still water.
Treeless Ridges and hollow Water Courses trending N.E.
Road to Lumelezi
Lumbo
Cameron's Halt
Ukindo Palms
Kamsengu R.
Dense Papyrus with 9 and 12 ft. water beneath
Former Lukuga R. now Lukuga Arm or Creek
U
G
U
21
27
26
27
28
30
26
24
30
27
30
26
25
24
26
27
20
Red Bluff Tree clad
Nanda
Kamanya
Chief Kawe
Nyanzi's Farm
Kaseke R.
Samani
Fishing Village & Camp
Kara
Low Pt.
(Mud) Inner bar (Mud)
Chanl.
Between Bars
Alluvial deposit
Outer Sand Bar 2 to 4 ft. of water
Channel
Mkampemba
Chief's Village
L. TANGANIKA
0 ½ 1 2 3 Sta. Miles.

Map of the
LUKUGA
By H. M. Stanley.
Scale 1 : 100.000.

E. G. Ravenstein.



E. G. Ravenstein.

species to be determined. Some of these creatures are said by the Indians to hunt in packs. Mr. Brown gives at pages 72-6 a humorous account of the alarm caused by Warracaba tigers, and the following account of the jaguars and peccaries is, we think, particularly curious:—

> "On one occasion when we had landed, and were hunting a herd of bush hogs, two men were left in charge of the boat. We had not been away in the forest for more than two or three minutes, when the men in the boat heard a heavy foot-tread on the bank above them, and looking up saw a large jaguar gazing down on them from the very spot up which we had clambered. They immediately pushed the boat off into the stream for safety, fearing an attack from the tiger, as they had no gun to defend themselves with. They told me that this jaguar was what the Indians call the master of the flock of hogs we had been hunting; that it follows them wherever they go; and that when it is hungry, and finds a pig a little distance from the rest, it pounces upon it, killing it with one blow of its huge paw. The squeak of the stricken hog brings down the whole herd to the spot, whereupon the jaguar climbs a tree for safety till the storm it brewed is over and the pigs have left the spot, when it descends to feed on the flesh of its victim. I suppose when it has *cleaned out* an entire flock it seeks another one and proceeds as before.
>
> "A story is told of an Indian who was following up a flock of hogs to get a shot, when he saw a jaguar knock over a member of it, as just described. When the flock bore down on the jaguar, it jumped upon a low fallen tree where it was surrounded immediately by the enraged hogs. Unfortunately for the jaguar it was not beyond their reach, and in a minute was dragged down amongst them, trampled on, and ripped to pieces.
>
> "One can easily conceive how the number of bush hogs is kept down in this way by large tigers of various sorts preying upon them, but it is more difficult to understand what keeps the numbers of large tigers from increasing. They appear to have no enemies, nothing preys upon them, and the few killed by Indians would not affect their numbers in any sensible degree. Both animals increase at the same rate, the jaguars having from two or three cubs at a birth, and the peccary about the same number of young."

The Indians, who are fond of pets, succeed in taming some sorts of *tiger*.

Stinging rays were frequently seen on the sandy bottom, or grovelling for worms on the muddy banks under water. The wound caused by this creature's spine or sting is very serious. Mr. Brown's interpreter trod upon one and suffered agonies; for a week he was unable to put his foot to the ground, and the wound did not thoroughly heal for six weeks. Our author only once met with a sloth. We notice, with pleasure, that he is not one of those sportsmen who have such a thirst for blood that they must fire at every living creature which comes across their path. When not in want of fresh meat, he can watch a tapir in the water, and "it did him good to see the way in which it enjoyed its *tub*, diving in the deep water, and plunging and splashing in the shallow."

Mr. Brown comes across both of those useful plants which nature has provided to supply substitutes for both milk and water. The milk or cow tree *Tabernæmontana utilis*, "from an incision in the bark of which we obtained a good flow of thick, white, creamy sap, of a rich nutty flavour, but a little of it went a long way." And the vine, a portion of the stem of which, five feet long, produced at least a pint of pure, clear, cool water.

Want of space prevents our doing more than calling the readers attention to the strange and unaccountable noises in the mountains; to the highest waterfall in the world; and to the picturesque mountain region of Roraima with its flat top and lofty inaccessible cliffs of white, pink, and red sandstone.

The Cradle of the Blue Nile. By *E. A. De Cosson.* 2 vols. Illustrations. (London, Murray, 1877).

Mr. E. A. de Cosson, a young officer in one of Her Majesty's regiments of Guards, has written a most readable book on a holiday trip through Egypt and Abyssinia. He may not be able to boast of having made geographical discoveries, or rectified existing maps, but he has seen much, and has described what he saw in an unexceptionable manner. In the course of his wanderings he paid a visit to King Yohannes, of Abyssina, whom he found encamped near Lake Tsana; he hunted the lion and the leopard; and has a great deal to tell us about Egyptian misgovernment and the slave trade. Of the Khedive's dominions he says:—

"Nature has indeed been lavish in her gifts to Egypt. Possessed of an inexhaustible river, and a glorious climate, her plains, were they but irrigated, might be rich with every kind of harvest, and her ports teeming with trade; but a fatal apathy seems to reign through the land, the Pashas are rapacious, their underlings indolent, the government wasteful in the extreme, the motto of the country 'Bukhara inshallah' (to-morrow, if it please Allah!)—to-morrow, *always* to-morrow, *never* to-day. What wonder, then, that instead of smiling in plenty, her peasantry are starving, and her very palm-trees growing under heavy taxation."

If Mr. de Cosson can be believed the slave-trade flourishes to-day as it has done for years past, and the bastinado is one of the most usual punishments meted out to those who give offence to the powers that be. The French Consul at Massaua—England is not represented in any of the Egyptian ports on the Red Sea—had a great deal to report about the manner in which that detestable traffic in human flesh is being carried on. His remonstrances on behalf of slaves, though exercised in accordance with edicts issued by the Khedive, are hardly ever attended to, and the despatches which he forwarded to his own government were intercepted by the Egyptian authorities. An Abyssinian who was sent to Prince Kassa of Tigre with despatches from the English Government, was summoned to the presence of Munzinger Pasha, on his return to Massaua, and on his refusing to relate what was the purport of the letters addressed by England to Prince Kassa, and also what the Prince had said in reply, was immediately given 200 blows with the bastinado. Can this be true; and if true, what reparation has England exacted from the Egyptian Government? At Galabat Mr. De Cosson found a slave-market flourishing, and an English merchant writes to him from Jiddah, that the Khedive's steamers continually bring slaves, "especially the pale and expensive ones," from Suakin and Massaua, the dealers paying a poll-tax to the Turkish Government. Many ships, we are told, which sail under the British flag, belong to Arab owners, and have the greater part of their crews composed of slaves. This was in 1875. At the time of the author's visit, the official representative of England at Jiddah was a Muhammadan, unable to speak English! Have matters mended since then? We believe not. The Egyptian Government is evidently unable or unwilling to suppress the slave-trade; even the Khedive's harem draws its supplies of human flesh from Massaua; nor will matters mend until properly qualified consular officers are sent to the principal ports of the Red Sea, together with a couple of gun-boats, to support them.

——:o:——

Peru in the Guano Age, being a short account of a recent visit to the Guano deposits, by *A. J. Duffield.* (Bentley, 1877.)

Mr. Duffield gives some account of the guano deposits of the Peruvian coast after a recent visit. Peru, he says, has sold 20,000,000 tons of guano, at about 12*l.*

a ton, up to the present time, and the three famous Chincha Islands are now exhausted. The quantity of guano still remaining amounts to between 7 and 8,000,000 tons.

The new deposits are chiefly in the extreme south of the Republic, near the Bolivian frontier. The first is at the Pabellon de Pica, which was covered with nearly 50 feet of sand and stones. The principal slopes are now uncovered, and Mr. Duffield calculates the contents of the deposit at 1,000,000 tons. The upper crust of stones and sand had compressed the guano into so hard a mass that it had to be blasted with gunpowder before it could be conveyed by wooden shoots into the ship's launches underneath. The next series of deposits, about 8 miles farther south, is on a point called Punta de Lobos. Here there are 2,500,000 tons of good guano, all overlooking the sea. Still further south is Huanillos, with about 800,000 tons buried under huge boulders of rock; at Chipana, 6 miles south of Huanillos, there are also said to be 800,000 tons; and there are smaller deposits at Chomache, Islotas de Pajaros, Quebrada de Pica, and Patache. The whole quantity in these southern deposits is estimated at 6,000,000 tons of good guano. The principal labourers are Chinamen and Chilians, and at the time of Mr. Duffield's visit in 1876, there were no less than 300 ships waiting for cargoes.

In the north there is a large deposit on the island of Lobos de Afuera, in latitude 6° 57′ 20″ S., amounting to not less than 650,000 tons. The adjacent island of Lobos de Tierra contains more than 800,000 tons. There are a score of smaller deposits having in all 115,900 tons; which makes 1,565,900 tons on the northern coast. So that the total quantity remaining to Peru is 6,565,900 tons, but, according to Mr. Duffield, 7,500,000 tons. That reporter hints that he has detected indications of other large deposits on the southern shore, but he intends to keep them to himself for a more convenient season.

In our number for December 1874 (p. 370) we had an article describing "The New Guano Deposits of Peru," and, quoting a report of two civil engineers, which estimated the quantity of guano in the southern deposits alone at 7,400,000 tons, exclusive of that on the northern coast. But it seems probable that Mr. Duffield's more moderate estimate is nearer the truth.

As regards the nitrate of soda in the province of Tarapaca, Mr. Duffield says that 1,508,000 cwts. were sold in 1863, and 5,830,000 in 1873. The region of nitrate is a barren plain, 3000 feet above the sea, containing 150 square miles of land, which will yield at least 70,000,000 tons of nitrate, selling at 12*l.* a ton. Fuller information respecting the nitrate of soda trade will be found in our numbers for December, 1873, p. 385, December, 1874, p. 370, and April, 1876, p. 90.

Mr. Duffield's book consists of 151 pages. The accounts of the guano deposits and of the nitrate works are comprised in 50, from pp. 71 to 120. The rest will scarcely repay perusal, if we except the extracts from Colonel Espinosa's really admirable *Diccionario Republicano*, which, however, should be read in the original to be properly appreciated.

NARRATIVE OF THE DISCOVERY OF THE GREAT CENTRAL LAKES OF AFRICA. By *J. L. Clifford Smith.* (Halifax, 1877.)

IN a small pamphlet of 32 pages, the author tells the story of the recent discovery and exploration of the four principal lakes of Central Africa. In his company we follow in the footsteps of Burton, Speke, Grant, Baker, and Stanley, and we are made to rejoice in the rapidity with which so large and interesting a portion of Central Africa has been revealed to us in the course of twenty years. The narrative has been carefully compiled and is well written. The author holds that the existence of these lakes was known to the ancients and the Portuguese during the middle ages, and Mr. Major has shown that there are some grounds for this opinion; but the subject is one too comprehensive to be dealt with on the present occasion.

GESCHICHTE DES ZEITALTERS. Der *Entdeckungen von Oscar Peschel.* 2te Auflage. (Stuttgart, London, Siegle.)

IN Oscar Peschel, Germany has lost one of her foremost geographers, prominent alike for his learning as for the finished style in which he placed the results of his researches before the public. This "History of the Age of Discoveries," is certainly the most popular work written by him, and we feel indebted to the publishers for providing us with a second edition of so valuable and interesting a work. The author describes the great voyages of Portuguese and Spaniards, from the time of Henry the Navigator, to that of Vasca da Gama, Columbus and Magalhaes. He shows the influence which these discoveries had upon thought in Europe, and throughout treats his subject in a philosophical spirit. The book is well written and printed in legible Latin type, and should certainly not be neglected by those who deal with the history of geography.

Cartography.

OFFICIAL EUROPEAN CARTOGRAPHY IN 1875-76.

(Continued from page 106 of our last number.)

IN FRANCE geographical activity has been incessant since the termination of the war. The large map on a scale of 1:80,000, in 267 sheets, has been completed, with the exception of seven sheets. In the course of 1876, sheets 179, 213, and 225 were published; and we are thus in possession of a map of the whole of continental France, on a uniform scale, and executed in a style of superior excellence. Of the seven sheets of Corsica four are in the hands of the engravers.[*] The cheap edition of this map, which is sold at the small price of 10*d.* a sheet, has likewise been published, with the exception of sheet 168 (Lyons), which is undergoing correction. A similar edition of our own expensive one-inch map might recommend itself, if it were only for the sake of protecting the public against certain pretended "reductions" of the ordnance survey, which are being hawked about by "enterprising" publishers. The same map has been utilised in the production of maps of arrondisements. Of the smaller map of France (scale 1:320,000) thirty-one sheets out of a total of thirty-three have now been published, with the hills, and the remaining two (37 Avignon, 33 Corsica) in outline only.

Amongst the work now in progress is a magnificent map of the French Alps, of which eighteen sheets, out of a total of seventy-two, have already been published. The map will embrace the whole of the territory between the meridians of Toulon and Turin, and between the Col de la Seigne, near Courmayeur, to the Col de Tende in the south. The scale is the same as that of the Carte de France (1:80,000), but the hydrographical features are printed in blue, and the hills delineated by brown equi-distant contours. The Dépôt de la Guerre has likewise published, since 1875, a map of the Department of the Seine in twenty sheets, on a scale of 1:20,000, and the Dépôt des Fortifications is issuing a Map of France in fifteen sheets, and on a scale of 1:500,000. This latter is being published in two editions, the one in outline, as a road map, the other with hills. A copy of this fine map, tinted according to height, was exhibited during the geographical congress at Paris, and attracted general attention. No progress appears to have been made recently with the geological Map of France (1:80,000). As far as we know, twelve sheets of this map have now been published[*] besides reference sheets and geological sections.

---

[*] Viz., sheets 161, 263, 265, and 267. Sheets 262, 264, and 266 have not yet been begun.

In ITALY considerable progress has been made with the Map of Southern Italy, on a scale of 1:50,000. This map embraces the whole of the old Kingdom of Naples, and will be completed in 180 sheets. The original surveys for this map are made on a scale of 1:20,000 or 1:25,000, the features of the ground being shown by contours. The published maps are produced by photography (Albert's heliographic process) or by Colonel Avet's process of heliogravure. The 122 sheets published embrace the whole of Sicily, Calabria, Basilicata, Foggia, Avellina, Salerno, and portions of adjoining provinces.[†] Amongst other recent publications a topographical map of the environs of Florence is deserving special attention as a triumph of cartographic delineation. The contours, at intervals of ten metres, are printed in a delicate red, the hills are tinted grey, and the execution is most creditable to Herr Müllhaupt, of Bern.[‡] The military authorities have likewise published a road map of the whole of Italy, in six sheets, on a scale of 1:1,000,000.

In SPAIN a beginning has at length been made with the publication of a Topographical Map on a scale of 1:50,000. The Trigonometrical Survey, under the direction of General Ibanez, has been in progress since 1858, or earlier, and its results, thus far, have been published in a volume of *Memorias de Instituto Geografica y Estadistica* (Madrid, 1875). Each sheet of the map will embrace an area 20 min. of longitude in width and 10 min. of latitude in height. The ground will be shown by contours laid down at intervals of 10 or 20 metres. Two sheets (Madrid and Colmenar viejo) were published in 1875, and as the number of sheets will be very large, many years must necessarily pass before Coelho's valuable map of Spain can be superseded by a more perfect work. The "Comision de la mapa geológico de España" likewise published *Memorias* and a *Boletin*, but the progress made is very slow.

Of the Topographical Map of PORTUGAL (1:100,000), thirty-seven sheets have been published since 1856, under the superintendence of General Folque, of the corps of Military Engineers. The hills, on the first sheets, were shown by hachures, but subsequently the more expeditious method of contours (drawn at intervals of 25 metres) has been adopted. For general purposes the map on a scale 1:500,000, though by no means very distinct, will be found sufficient. It was published in 1871.

GREECE contents herself with the survey made by French Engineers in 1829-32, whilst TURKEY has not hitherto produced a single map based upon scientific principles. The Turkish maps exhibited two years ago at Paris, though found by a too-accommodating jury, deserving of prize-medals, were in reality very uncouth productions.

One of these specimens of native workmanship, a map of the Sanjak of Filibe, has recently been transcribed by Dr. H. Kiepert, and published in the *Zeitschrift* of the Berlin Geographical Society (1876). The most valuable contribution to the cartography of European Turkey has been made by the Austrian Military Geographical Institute. It consists of a map[§] of the north-western portion of the Balkan Peninsula, bounded by the latitude 42° N. and longitude 22° 30′ E. of Greenwich, and is based upon surveys by Austrian officers. The hills are drawn in chalk, the forests tinted green, and there are numerous altitudes. This map will be extended eastward, so as to embrace the whole of Bulgaria and the Danubian Principalities. Kanitz's map of Bulgaria, promised long ago, has not yet been published, though a prize was awarded for it at the Paris Exhibition, where it was *not* exhibited. The lower Danube has been delineated with much detail on a map prepared for the European Commission.[*]

M. Massaloup has published a general map of Romania,[†] which is interesting, not so much on account of its topography, but because it presents us with what we suppose to be the official nomenclature introduced since the substitution of the Latin for the Russian alphabet. Of Scheda's general map of Turkey and Greece a new edition has been published, as also of Handtke's large map, but neither of these can compare in general accuracy with Kiepert's well-known map published in 1871. Colonel Artamanof's Map of Turkey in Europe (scale, 1:420,000) has been published recently at Vienna (?), but we have not yet seen a copy of it. It ought to embody a great deal of valuable information collected by Russian officers, and not hitherto available.

In conclusion, a few words may be said with respect to maps embracing larger portions of Europe. The enlarged edition of Colonel Scheda's[‡] map of Central Europe was completed last year. Liebenow's[§] map on the same scale, which proved of such great service during the Franco-German war, is making slow progress, but of Reymann's excellent map, no new sheets appear to have been issued recently, though a new edition is in progress of publication.[||]

Log Book.

——:o:——

The Royal Awards of the Geographical Society for 1877.—The Council has awarded the Founders' Gold Medal to Captain Sir George Nares, K.C.B., F.R.G.S., as Commander of the Arctic Expedition, which so successfully, and in the face of such unparalleled difficulties, completed that portion of the exploration of the North Polar area which was accessible by the Smith Sound route. The Council has also awarded a Gold Watch, with an appropriate inscription, to Captain Markham, R.N., F.R.G.S., as Commander of the northern division of sledges, and for having reached the highest latitude ever attained by man. Captain Markham was the senior officer of the commanders of sledge exploring parties, whose admirable work is thus recognised by the Council. The Patron's Gold Medal has been awarded to Pundit Nain Sing, an account of whose discoveries on the plateau of Tibet will be found in our number for June 1876, p. 145.

---

[*] Sheets 31, 32, 33, 47, 48, 49, 64, 65, 66, 79, 80, and 81.

[†] Corpo di Stato maggiore:—Carta delle provincie meridionale del regno d'Italia:—sheets 22-25, 29-32, 37-40, 45-48, 54-57, 60, 63-67, 73-78, 82-87, 92-96, 99, 174, 106 bis, 109 bis, and 128 bis.

[‡] Istituto topografico militare:—Carte topografico dei dintorni di Firenze. 1:25,000. Nine sheets. Florence, 1876.

[§] K. K. Military Geographical Institution: Generalkarte von Serbien, Bosnien, Hercegowina and Montenegro. 1:300,000. 12 sheets. Vienna, 1876.

[*] R. Hansford et Ch. Kuhe, Carte du Danube et de ses embranchements entre Braïla et la mer. Levée en 1870-71 sous la direction de Sir Charles Hartley. 7 sheets. 1:73,000. Leipzig, 1875.

[†] Romania, compusa de I. V. Massaloup. 1:866,400. Bucuresci, 1875.

[‡] Scheda, Generalkarte von Central Europa (in Heliogravure). 1:300,000. 192 sheets at 1s.

[§] Liebenow: Specialkarte von Mittel-Europa, 1:300,000, in 164 sheets, of which sheets 1-42, 47, 55, 60, 67-69, 74, 81-83, 88-91, 95-97, 102-105, 109-111, 116-119, 123-133, 137-139, 142-143, 151-153, 156-158 have been published.

[||] Reymann's Specialkarte von Deutschland, &c. 1:000,000. 461 sheets at 1s. singly, or 9d. to subscribers. 336 sheets have been published.

The Dutch Polar Expedition.—Last March there was a large meeting in Holland, under the patronage of Prince Henry, to consider the propriety of fitting out an Arctic Expedition. Commodore Jansen opened the meeting with a speech, referring to a proposal by Herr de Yonge that monuments should be erected in various parts of the Arctic Regions, to perpetuate the memory of former Dutch discoveries. He also declared that the appeal of Lieutenant Koolemans Beynen had found an echo in the hearts of the people, and announced that H.R.H. Prince Henry had expressed his willingness to place himself at the head of this national undertaking. Commodore Jansen then requested Herr de Yonge to give a historical sketch illustrating his plan, and Lieutenant Beynen to submit a scheme of the proposed voyage, and an estimate of its probable cost. Finally he suggested the formation of a central and of local committees to consider the means of carrying out the proposal.

Herr de Yonge then gave a historical account of Dutch Arctic discoveries, and said that it was a sad truth that the old Dutch names were disappearing from the charts, and that modern foreign names were gradually taking their places. When the Circular of February 18th, 1877, was prepared by Commodore Jansen, Herr F. D. Frausen, Herr van de Putte, O Baron von Wassenaer Catwijck, and Lieutenant Beynen, they did not only think of the traditions of the past, but also of upholding the name of Holland in the eyes of Europe. They thought that, as the minds of other nations were now turned to the north, the Dutch should also undertake such voyages, both in vindication of their own self-respect, and for the good of their navy. Herr de Yonge named the following places as localities where monuments might appropriately be erected—Jan Mayen Island, Spitzbergen, Bear Island, Orange Island, and the Winter Harbour of Barents. A short discussion took place as to whether the English or Dutch had first discovered Jan Mayen Island, and the President decided that it was first seen by the English, but first landed on by the Dutch. Lieutenant Beynen then stated the best season for sailing and for visiting the different points, and recommended the use of a small steamer. He also entered upon details respecting the outfit, the provisioning, and the pay of the crew. It was finally agreed that a Central Committee should be named. The practical use of this first cruise will be that if, hereafter, it is decided that international scientific stations shall be established in the Arctic Regions, the Dutch will not be without experience, and will be in a position to take their rightful place in the work.

Wrangell Land.—Impropriety of changing names given by Discoverers.—In our number for October 1876 (p. 263), we gave an abstract of the pamphlet by Herr L. von Helmersen, showing the impropriety of Dr. Petermann's proposal to change the name of Wrangell Land, the name indicated by Captain Kellett and given by its actual discoverer Captain Long, to Kellett Land. The facts of the case have since been thus briefly stated by Baron von Wrangell's son. "Captain Long discovers a land, makes use of the right of every discoverer, and gives it the name of an Arctic explorer, who was prevented, by insurmountable difficulties from reaching this land, in the existence of which he had such strong reasons to believe that he traced it on his chart as highly probable: and from his chart it was copied into every other chart as probable land, until actually discovered by Long." This explorer was Wrangell. Long, as the discoverer, had a perfect right to name it, and Dr. Petermann certainly has no right whatever to alter the name when once given. It appears that Dr. Petermann endeavoured to show that Wrangell himself denied the existence of this land, by making two quotations from his work. His first quotation is to the effect that land alleged to have been discovered north of the Kolyma by Andeyef (see our number for October, 1876, p. 264) has no existence. But if Dr. Petermann had continued his quotation it would have been seen that in the very same page Baron von Wrangell says that the existence of an unknown land north of Cape Jakan, at a distance of 530 versts from the Kolyma, is probable. In his second quotation Dr. Petermann is equally unhappy. He says that Baron von Wrangell closes his report with the words "that in every attainable distance from the Asiatic shore there does not exist any land." But the report does not close with these words. Wrangell goes on to say that if there exists land in the north, in a region which he could not reach, its discovery ought to be undertaken straight from Cape Jakan, since it is there that, according to the inhabitants, the looked-for land approaches nearest to the main land. Both quotations when read to the end, prove the exact opposite of what Dr. Petermann intended his reader to believe, namely, that Wrangell never denied the existence of the land discovered by Long, and called by him Wrangell Land.

But all this is beside the question; which is, whether names given by discoverers are to be altered by any map maker who sees fit to question their propriety? We earnestly protest against such a proceeding as infringing on the acknowledged rights of discoverers, and as tending to every kind of confusion.

When Captain Kellett saw an extensive land between 70° 45′ and 71° 30′ N., (long. 178° to 178° 30′ W.), he concluded that it was the continuation of the mountains which, according to von Wrangell, are sometimes seen from Cape Jakan. He did not give it a definite name, but called it the continuation of Wrangell's Land. Long, who approached it so near as to leave no doubt whatever about its existence, made use of his indisputable right, and called it by the name which Kellett had indicated—Wrangell Land. We cordially concur in the view expressed in von Helmersen's concluding sentence—"It was through Baron Wrangell's work that trustworthy news respecting this land first reached the civilised world, and we think it only fair that it should for ever retain the name given to it by its discoverer Captain Long."

Turkey.—The Austrian Consul Sax, at Adrianople, furnishes some interesting information on the population of some of the towns of ancient Thrace. Constantinople he estimates to have a population of about 615,000 souls, viz., 290,000 in Stambul, 250,000 in Pera, Galata, and other European suburbs, and 75,000 in Scutari and the Asiatic suburbs. About 58 or 60 per cent. of the inhabitants are Turks, the remainder Greeks, Armenians, Jews, Franks, &c. In the Vilayet Edirne (Adrianople) there are twelve towns of over 10,000 inhabitants, viz., *Adrianople*, 60 to 62,000—say 22,000 Turks, 15,000 Greeks, 12,000 Bulgarians, and the remainder Spanish Jews, Armenians, gipsies and Franks; *Philippople* (Filibe), 28,000 inhabitants, of whom about one-half are Bulgarians, one-fourth Turks, one-sixth Greeks. *Eski Zaára*, 24,000 inhabitants, of whom two-thirds are Bulgarians, and the remainder Turks, gipsies, and Jews. *Sliven* (Islemief) 21 to 29,000 inhabitants, in the same proportions as in the preceding. *Sofia*, 18,000 inhabitants, of whom 6,000 are Turks, 6,000 Bulgarians, 4 or 5,000 Jews, and the rest gipsies and Armenians. *Rodosto* (Tekfur Daghij), 17,000 inhabitants, of whom more than half are Greeks, one-third Turks, and the remainder Bulgarians, Armenians, Jews, and gipsies. *Kirk Kilisse*, 16,000 inhabitants, of whom two-thirds are Bulgarians, one-fifth Turks, and as many Greeks. *Bazarjik*, 15,000 inhabitants, of whom more than half are Bulgarians and one-third Turks. *Kezanlyk*, 13 or 14,000 inhabitants, of whom nearly two-thirds are Bulgarians and the remainder Turks. *Khaskoi*, 12 or 13,000 inhabitants, more than one half of whom are Bulgarians. *Chirpan*, 12,000 inhabitants, including 8000 Bulgarians and 4000 Turks. *Samakof*, 12,000 inhabitants, mostly Bulgarians and Turks. *Yamboly, Gallipoli, Gomuljina*, and *Kostendil* have about 10,000 inhabitants each; the Bulgarians predominating in Yamboly, the Greeks in Gallipoli, and the Turks in Gomuljina. Demotika, Chorlu Dubritza, and Mustafa Pasha Koprissy (including Chirmen) have about 8000 inhabitants each; Karinabad, Akhyoli, Lule Burgas, Malgara, Keshan, and Sharkoi (Peristeri) about 5000 each. In all these towns, with the exception of Dimotika, the Christians predominate. The Turks, do not, in fact form a majority in any large town, Gomuljina and Dimotika alone excepted. They predominate, however, in a number of smaller places, such as Burgas, Uzunkopry, Ferre (Ferejik), Khaireboly, Viza and others. Mastanly in the Rhodope is exclusively inhabited by Muhammadans, and Samakovo in the Stranja by Christians. The above statements are derived from the official annuals, published in the capitals of the vilayets, which give the number of houses and of male inhabitants (*Mittheilungen of the Vienna Geographical Society*, vol. xx., p. 126).

Colonel Prejevalsky in Central Asia.—The latest news from Colonel Prejevalsky was received at St. Petersburg by way of Vernoe on the 11th March last. The telegram referred to was to the following effect:—"On the 30th January, having left Kurla on Lake Lob-Nor, I crossed the lower Tarim. The valley of the river is but thinly populated; its height is rather more than 2000 feet, the fauna and flora are both very poor, and the topography of the country is quite different from what it is shown to be on the best maps. I am now in the Altyn-Tag Mountains, a little south of Lake Lob-Nor. Some of the valleys rose to the height of 11,000 feet. Here, and lower down, wild camels are to be seen; I hunt these animals which are very shy. Near Lob-Nor I have seen the ruins of two ancient towns. I shall pass February and March on Lake Lob; April on the Lower Tarim; May and June on the Tian-Shan, and in the first days of July I shall return to Kulja. The scientific labours of the expedition are progressing with success: all my companions are in good health and full of zeal."

Ethnology of Russia in Europe.—A most interesting paper on the nations inhabiting European Russia has been published in Petermann's *Mittheilungen*, 1877, Parts I. and IV. It is accompanied by an elaborate ethnological map of the whole of the Russian Empire, based upon the labours of Rittich and Veniukof, and contains a great deal of historical and statistical information. The numerical distribution of the various races is given for each government. We confine ourselves to the following summary.

Russians (Great, 34,389,871; Little, 14,193,663; White, 3,592,057)	52,175,593
Other Slavs (4,764,713 Poles; 93,685 Bulgarians; 7790 Chechians; 7614 Servians)	4,833,802
Lithuanian (811,051 Lithuanians; 623,700 Shmudes; 1,047,929 Letts)	2,482,680
Germanic (983,471 Germans; 273,021 Swedes; 188 English)	1,256,680
Greco-Latin (648,464 Romanians, 77,132 Greeks; 1036 French)	726,632
Iranian (34,200 Armenians; 111,654 Gipsies)	145,854
Semitic (Jews)	2,552,145
Caucasians (617 Andyge; 181 Georgians) ...	798
Samoyeds	5370
Ugrians (Voguls)	2031
Volga Fins (791,954 Mordvins; 259,745 Cheremis)	1,051,699
Permians (240,490 Votyaks; 67,315 Permians; 85,432 Syrgani)	393,237
Fins (2,013,551 Kareli; 48,028 Chudes; 746,522 Esthonians; 2541 Livonians; 7497 Laps)	2,818,139
Tatars (1,212,610 Tatars; 15,585 Nogai; 156,462 Kirgiz; 2162 Karakalpaks; 1781 Turkmen)	1,488,600
Tatarised Fins (755,868 Bashkirs; 1443 Besermians; 136,463 Meshcheryaks; 126,023 Teptiars; 569,894 Chuvash)	1,589,691
Mongols (Calmucks)	107,531
	71,470,482

In Asiatic Russia there are 4,120,688 Russians and 26,762 (?) Poles.

Peru.—Professor Charles Wiener, now travelling in Peru, complains much about the insufficiency of the maps of that country. Raimondi's map of Ancachs he calls a "mere imaginary topographical delineation," though not without value in some respects. The distances between the different towns as given on route maps cannot be trusted. Mile-stones have been erected along the principal roads, but the distances between them cannot be trusted. The Peruvians have very vague notions as regards a mile. The official legua is 4·237 kilometres. Professor Wiener carefully measured the distance between two mile-stones, and found that it amounted to 5·857 kilometres. As government pay their couriers at so much a legua, they appear to be interested in placing these stones as far apart as possible. There are "leguas largas," "de gobierno," and "de posta." The distance from Cajarmarca to Cuzco is usually assumed to amount to 450 leguas, though officially it is only 350.

Baron von Richthofen's new work on China.—The first volume of Baron von Richthofen's elaborate work on China was announced some time since, and has been in print for about three months. But it was found advisable to delay the publication, for the purpose of adding explanatory maps to illustrate the historical geography which forms the chief part of its contents. The volume is now on the point of being issued, and may anticipate this notice.

Correspondence.

—:o:—

TRANS-HIMALAYAN MISSIONS.

To the Editor of the "GEOGRAPHICAL MAGAZINE."

SIR,—An article appeared in the *Calcutta Review* for January last, on "Trans-Himálayan Missions and their Results." Its aim is to bring about the abandonment of enquiry in that direction, and to put a stop to the progress which is being made towards the establishment of commercial intercourse with the neighbouring countries along our Indian frontier. This, too, at a time when the almost utter ignorance which prevailed in every quarter, more especially the highest, is being enlightened and instructed, by information of the most valuable character in every respect—political, military, commercial, religious, and scientific, indeed, in all that relates to human interests. And not only so, for at the present moment there are some hopes that through Sir Thomas Wade's intervention at the Court of Peking, the political obstructions to European intercourse along the Indo-Chinese frontier, which have hitherto been strictly maintained, and repeatedly found to be inviolable, are at length brought under diplomatic consideration with a fair prospect of ultimate removal. All this, and more, of which notice will be taken hereafter, our Reviewer would absolutely abandon, and revert to the former state of blank and chaotic darkness and stolid indifference.

This writer, at the seat of the Indian Government in Calcutta, endeavours to enforce his opinion, with elaborate arguments based on superficial if abundant learning, that there is no wealth in Trans-Himálayan countries, that Warren Hastings was mistaken in expecting to find any, and that the recent revival of the first Governor-General's sagacious efforts, are repetitions of that mistake.

No doubt the efforts of the Indian Government have not hitherto been attended with much commercial success, for the beginning was made at the wrong end. So far the attempt to open up trade has consisted in endeavouring to sell our own articles to the people beyond our frontiers—a peddling procedure, from which nothing of any magnitude could be reasonably expected. The disappointment already arising is declared in the unwise reaction which the Reviewer has undertaken to promote. His elaborate research displays no insight; and I would urge that there should be a fresh start on a more rational basis, at once simple and aiming at great national ends.

It is well known that Tibet with Mongolia beyond, together with the former Chinese province of Ili, which for the present is independent, constitute one vast pastoral region, abounding in flocks and herds from time immemorial. We say nothing of its extensive gold-fields and precious stones, its borax and other products. These may be left to secondary operations. But for wool there is an unbounded demand, it is the original staple of our national wealth and manufacturing industry. Its importance in English eyes is typified in its being used as the official seat of the highest functionary of the realm, second only to the prehistoric boulder of Scone, which forms the unique throne of our sovereign, and is considered by the learned to carry with it imperial destinies.

It is not only the quantity of the wool in the regions along our Indian frontier, but also its unequalled quality that invites our attention. For in these elevated pastures the sheep produces a fleece of a most valuable and peculiar description, affording the animal an extra protection against the inclemency of the loftiest regions in the world.

But the Reviewer asserts that this Tibetan wool cannot be brought into the market on account of the cost of carriage. How does he know? Have any enquiries been made among the flock owners of Tibet on the subject? It is not a question that can be answered by our own or Australian experience, although in Australia it must be remembered that the wool has for the most part to be carted from great distances to the ports.

In Tibet there is this remarkable circumstance to be taken into account, the sheep is in that country a beast of burden, carrying loads usually of 32 lbs. weight; and a flock of 1200 laden sheep can be conducted over mountain paths by half a dozen native shepherds. Captain J. Biddulph made a small experiment on travelling with laden sheep, which is narrated in the *Report of Sir T. Douglas Forsyth's Mission to Yarkand, in* 1873;" and there is abundant evidence besides of a more practical character. Furthermore, it is only requisite to reach certain points along the whole range of the Himálaya, to find rivers capable of conveying the produce for the rest of the way to the port, and in time the railways may be expected to compete for the trade.

The pastoral arrangements necessary for the periodical passage of flocks and herds, are quite familiar to the chiefs, flock owners, and people of the Himálaya and Tibet. In the mountainous parts of the Punjab, our own officials have already acquired some experience of this kind, and all that can be requisite must be capable of suitable adjustment. The subject is of great importance in the present case, as it bears on the question of the carriage of the wool to points in or near the plains, which afford facilities of land and water conveyance. It is one to be devised and worked out in the first place with the flock-owners; and then, if necessary, the aid of government may be invoked. I would deprecate such ideas on this point as led to the construction of the unfinished Dalhousie Himálayan Road, or any other schemes involving extravagant outlay. Our young enterprise must not be weighed down by costly refinements. Economy depends on adhering, at first, to the customary expedients of the natives.

We say, then, confidently, that commerce with the pastoral regions that stretch for two thousand miles along our Indian frontier, is to be opened up, not by the peddling course so far pursued, but by entering the country as buyers to any extent, within limits of price and conditions of delivery at certain points where ordinary land and water carriage would have to be employed. The flock-owners thus enriched, would naturally become our customers for manufactures, including even the fabrics for which they have supplied the raw material.

This is the effectual way to establish not only a profitable commerce of importance to our manufacturing industries, all along our Indian frontier, but also peaceful relations with the respective governments, and an extension of our influence throughout Asia, commensurate with our capital and commercial resources.

No one can estimate the development which such a trade, when once started, might undergo. The prospect points to a double series of diplomatic operations tending to Europeanize the Asiatic continent. The first would be a series of Boundary Treaties to appease territorial apprehensions, the second would be Commercial Treaties to regulate the traffic.

Before I conclude, allow me to point out the alternative. While the Calcutta Reviewer is advocating the cessation of Himálayan Missions and Himálayan Exploration, our friends the Russians are pushing their expeditions through all parts of Mongolia, and have already reached the confines of Tibet. In the interests of their favoured manufactories, the Russians are not likely to be indifferent to the raw materials of Mongolia and Tibet, or to the return trade which their purchase must beget.

But the inferior capabilities of the Russian manufactories cannot secure for them a market, unless it be protected from competition. Hence territorial aggrandizement becomes necessary to the extension of Russian commerce and the support of her exclusive system.

The Government of Peking is thus compelled to look upon the Russian trade in the Chinese dominions as a threat of territorial aggression. With a characteristic sagacity which may be commended to the serious study of our Calcutta Reviewer, not to speak of others in more responsible positions, Russia has perceived the key to popular influence throughout Northern Mongolia; a key, too, which finds responsive strings and chords over the whole of the wide region, which is subject to the spiritual domination of the Lamas, and which, through that superstitious influence, could be roused into a religious or political excitement at any moment.

It is Urga to which we allude, the seat of the Taranath Lama, or Patriarch of the Mongolian Hierarchy. The power of this high priest and his subordinates is so well understood by the Chinese Government, that his appointment or selection has been removed as far as possible from the influence of the Kalka Princes, among whom he resides, and made directly dependant on the Grand Lama of Tibet. Still it must be obvious that the Taranath remains the centre of an organisation capable of exciting a dangerous population; and, as such, the Russians have not only succeeded in establishing a political agency at Urga, but they have made good their claim to support it by an armed force.* Meanwhile our Calcutta officials find it difficult to understand what the name of Kalka or Karka means. Starting with the assumption that it referred to some unknown town, they cannot divest their minds of that idea, and wilfully resist the true explanation, which is by no means a secret to less pretentious students of Central Asia. The Kalka is a river of Outer Mongolia, on which the princes of the Mongol dynasty settled when they were expelled from the throne of China. Hence their descendants are now known as the Kalkas or Karkas, and they hold the four Kalka Khanates, named Tuchetu, Sannoin, Zassactu, and Tsetsen, which together constitute the Chinese Colonial Government of Outer Mongolia. Once rulers of the Chinese Empire, the Kalkas must continue to be deserving of the watchful attention of the Chinese Government; and it was to counteract their influence that the selection of the Taranath Lama was taken from them, and entrusted to the authorities at Lhasa.

This state of things must command attention, if the natural resources of the Tibetan frontier are to become the objects of our commerce. The proximity of Lhasa to India, not to speak of the deep attractions which intercourse with India presents to all sincere followers of Buddha, would then obviously become an immense political advantage to those in power in India who are sensible of its use. Among the numerous scattered families, who pass from pasture to pasture with the regularity of the seasons, the Lamas, in their religious circuits, become the means of communication and intercourse, and it is clearly of the first importance to stand well with that priestly class, through the hierarchy which governs them. In Lhasa—a place at no great distance from the Indian frontier, and by no means difficult of access, if political obstructions were withdrawn—is the sacred centre of that hierarchical authority to which even the Taranath of Urga is subservient. We should have, thus, in the possession of influence at Lhasa, a direct counterpoise against Russian influence at Urga, not merely outweighing it, but capable of subverting it altogether.

All our precedents are highly in favour of a satisfactory issue to serious efforts perseveringly made to establish intercourse with Lhasa. To the Chinese paramount Government we can honestly unfold our views as having none other than a commercial character, inasmuch as we require nothing more than an open market, and are well content to leave to them the burden of administration as well as the improved revenues and official advancement consequent on prosperous trade. While Russian trade threatens China with nothing less than total territorial absorption, British trade is certain to promote the national wealth, the prosperity of the people, and the security of a government amenable to progress. Consequent on prosperous trade with the native Tibetan, we need not apprehend any real difficulty. The Chinese, we know, are keen and unscrupulous competitors, with a tendency to exclusiveness, which however is not insurmountable, but we have nothing to guard against from them in the way of territorial aggression. It is far different with the Russians. Commercially exclusive, territorially aggressive, and swayed by unlimited military ambition, it is impossible to conceive of a more dangerous neighbour than the Russian, or one with whom it would be more difficult to remain at peace. A Russian occupation of Mongolia and Tibet would not only be a death blow to our commercial expectations in those quarters, but it would also give occasion for very serious general anxiety. Let it be remembered that those regions have, in former times, been the birth-place of devastating irruptions which have overrun the old world from east to west. China, South-Eastern Asia, India, Persia, Turkey, and Russia itself, have been subdued by the hardy shepherds of these pastoral and sparsely-peopled tracts, whenever a great leader has arisen among them.

The people are as hardy and warlike as ever. Their traditions render them keenly alive to the attractions of conquest. Under the military organisation of Russia, they would be fitted to compete with modern armies, and with such a recruiting ground the power of Russia would be immeasurably increased.

What a contrast to the realisation of pastoral prosperity and contentment which would follow from the inauguration of British enterprise in this great Land of Wool. Wealth would pour in; the safety of life and property would become a necessity; and the increase of population is the obvious result. But instead of pouring forth in devastating hordes upon the unoffending populations around, their surplus hands would pass off as peaceable emigrants to replenish other parts of the earth. Is it consistent with modern statesmanship to look so far ahead, or is the *Calcutta Review* its exponent? T. S.

———:o:———

AMU-DARYA EXPLORATION.

To *the Editor of the* "Geographical Magazine."

Sir,—I was not a little surprised on examining the map of the Upper Amú, based upon observations of the Russian exploring party of 1875, which was published in your number for December 1876. On this map I find 300 feet given for the elevation of the bank of the river, in (about) long. 65° 45′; a figure that *must* be erroneous, if it be remembered that the height of Toyonboyin, some hundreds of miles further down the stream, was found by *spirit-levelling*, in 1874, to be 365 feet above mean sea level.

The height 300 is much more likely to be 1300 feet; since Burnes (I believe) stated Balkh to have an elevation of 1800 feet, and to be situated on ground which sloped gently down to the Oxus. The figures I have suggested, would, I may remark, be also in consonance with the height given by the Russians for Karshi, viz., 820 feet.

Those who follow the development of steam-navigation on the Amú, will probably have noted two passages in Captain Burnaby's *Ride to Khiva*, on p. 163. The gallant author mentions my having accompanied the Russian Expedition that was sent to the Amú in 1874, "as far as Petro-Alexandrovsk;" and he adds, that since then, "some Russian officers had ascended the river, seventy versts beyond that part." On p. 197, it is also stated, that since 1875, "the river Oxus has been surveyed for a considerable distance beyond the fort, *i.e.*, (Petro Alexandrovsk). These passages probably mean that in 1875, the Aral flotilla steamers reached Toyon-boyin; the point up to which the Amú-darya was actually reconnoitred in 1874, although the 'Peroffsky' steamed in that year, as far as Petro Alexandrovsk only. Readers of my paper on the Oxus, that was published in the *Journal of the R. G. S.* for 1875, will have seen that there was no particular obstacle to the ascent of steamers as far as Toyon-boyin. But, as Captain Burnaby remarks, that "it is as important to Englishmen as to Russians, to know how far the mighty stream is navigable," I here venture to reiterate the opinion I have already expressed, that "some years will elapse before a steamer *steams* up through the gap at Toyon-boyin."

---

* Professor Wassiljew's Russian account of the Taranath Lamas, and the doctrinal work of one of them, together with the translation into German by Prof. Schiefner, has been noticed by Mr. Markham in his Introduction to *Bogle's Journey to Tibet*. The Government of India, as one alive and sensible to Asiatic politics, should have this work translated into English.

It is, probably, for the purpose of overcoming the difficulty at this point, that a Russian steamer was being built in 1875 (*vide* p. 163 of *A Ride to Khiva*), "which would draw but little water and steam twenty versts per hour;" and which "would be able to ascend the stream for a much greater distance, and perhaps to the source of the river" (!) With such a boat, no doubt, the passage of the gap at Toyon-boyin could be achieved; though I confess to some unbelief as to the possibility of its construction, to say nothing of the question as to where the fuel it must consume is to come from.

Yours faithfully,
March 18*th*, 1877. Herbert Wood.

⁂ Major Wood is quite right to question the correctness of the altitudes on the map illustrating the Hissar Expedition. These figures were copied from the Russian map, which we reproduced. On the same map Kabadian is stated to be 450 feet above the sea, and 300 for the Amú bed cannot therefore be a misprint for 1300 feet.

———: o :———

THE PECHENEGS.

To the Editor of the "Geographical Magazine."

Sir,—In reference to Mr. Vambery's derivation of Pecheneg, I would commend to the notice of Mr. Howorth, who has raised the point, another and perhaps, indeed, a less forced and more natural explanation. Frähn in his Notes to Ibn-Fozlan's accurate description of the Ancient Russ, reproduces a great many variations of the name from Arab and other writers, among which are Benageca, Benakije, Iedschnakije, *Petchenakije*, and last, though not least significant, thus, Badgia*niki*.

Now the Pechenegs, or Petchenegans, so-called, appear for the first time in history in the tenth century, *i.e.*, in the time of the Varangian Igor, during the period of his coercion of the Drevlians (Ancients, or Dwellers in Forests?)

It is to be observed that this period corresponds exactly with that of the Muhammadan or Arab and Byzantine writers on Scythia, whence it may, perhaps, be presumed that the name Pecheneg passed from the Varangians in its Sclav form to Constantinople and to Arabian travellers and merchants in a corrupted form, through the channel of commercial relations with the East, by way of the Greek Colonies in the Azof.

Hyppocrates, Herodotus, and others give us what, I think, may be accepted as very faithful descriptions of the habits and customs of the various Turk tribes of Scythia which formed, by-and-bye, the main elements of the Russ as a people—the Sclavs in Russia being but a small component part, cut off from their main stock by the freebooting and brave Varangians along the line of the Dnieper.

These habits and customs are peculiarly characteristic of modern Russia. Among the tribes alluded to we find the Pechenegs spoken of as particularly addicted to vapouring themselves in that kind of steam-bath, which seems to me, on reading through all accounts, from the earliest period to that of my own acquaintance with them, to have preserved up to this day all their original features—little, low, wooden hovels, with one apartment, containing a raised gradiating platform, and a brick stove, which, after being heated, is splashed with water for the purpose of producing steam.

The Pechenegs were thus famed by their vapour bath, and the *petch*, *petchka*, or stove, was most probably exactly what it is now all over Russia, as also among the Finlanders, a kindred and a once neighbouring tribe, among whom the *cania*, *cagnia*, or bath, is preserved in all its pristine glory.

To be brief, then, I am inclined to the belief that nicknaming the people in question after their common and notorious practice of the vapour bath, the Varangians handed them over to Constantinople, and down to posterity, as *Petchniki*, and as *Banniki*, just as they conferred the contemptuous epithet of *Mujiki*, or Mannikins, on the Russ—less manly than themselves, who would not obey their martial summons when they came to rule the country.

I would here add that in Masudi the name Jahki is applied to the same people. Was it not here that Swift found his Yahoos?

I am, Sir, yours, &c.,
March 12*th*, 1877. Robert Michell.

———: o :———

DISCOVERY OF A PORT NEAR INAMBANE, EAST COAST OF AFRICA.

Burra Falsa, Cape Lady Grey.

Native name—Pumene, S.E. Africa. Lat. S. 22° 56′. Long. E. 35° 41′.

To the Editor of the "Geographical Magazine."

Sir,—Having been blown to sea, by a south-west wind, in a covered launch, from Inhambane, whilst endeavouring to reach the mail steamer for Natal, we sought refuge in this bight, and being obliged to land for food and water, the wind still continuing furiously strong and unfavourable, we sought the entrance to the river and found it. As there is no description of this port in any nautical publication, I have thought proper to address this to you for publication.

The river is nearly at the bottom of the bay, about three miles north of the Cape. It was nearly low water when we entered, with a strong southerly gale blowing; nevertheless, the rollers, though high, were not dangerous, and we soon slid through them into the calm water beyond. The entrance, unless when very close, is difficult to discover, but is marked by a very large solitary *fir* tree (of the species peculiar to this coast), which stands back against the mangroves inside. At full tide there would be twelve feet or more of water in the mouth. The river coming from the south is confined for a great distance by a low sand bank; inside it is nearly dry at low water, though there are still channels through the lagoon. Great quantities of sea fish are found therein, and good water is to be had at the head of the lagoon.

The natives being tributary to the Portuguese are, therefore, very friendly; and, for calico, will sell food, consisting of fowls, goats, manioc, fish, pea-nuts, sorghum, and maize. They have also a little rice, bannanas, and sugar cane. Two or three cocoa-nut trees can be seen from the bay outside, standing amongst the fir wood on the spit. The natives will also sell for blue bafta, a little bees wax, india-rubber, and hides.

It is said, with moderate weather or northerly winds, there is little or no surf on the shoals.

Cape Lady Grey is easily distinguished by its rocky point, upon which stands a solitary rock, like a small hut or sentry box. In southerly weather there are rollers round the Cape—it should be given a berth of half a mile and the middle of the bay sought. There are four or five fathoms of water in the bight within half a mile of the shore. The holding-ground is good, being hard sand. In case of "castaways" from wrecks seeking to land in boats, it offers every advantage. It is about three days' walk from Inhambane. There is no other opening than this between Inhambane and Bazaruta that is available as a landing place.

Yours, &c., St. Vincent Erskine.

Inhambane, S.E. Africa.

———:o:———

THE RECENT VOLCANIC IRRUPTION AT THE SANDWICH ISLANDS.

To the Editor of the "Geographical Magazine."

Sir,—Many of your readers may be interested in hearing of the recent outbreak of Mauna Loa, the great volcano of Hawaii. On the night of Wednesday, the 14th inst., a brilliant eruption burst out from near the summit. A tremendous volume of smoke, ascending many hundred feet above the mountain-top, was illuminated by the red, fiery glare from beneath it, proceeding apparently from a small crater some miles distant from the great summit crater. As viewed from the deck of a vessel anchored 70 miles distant in a north-westerly direction from the mountain, five distinct columns of fire could be seen, thrown up almost instantaneously, and capped by tremendous masses of smoke. The illumination was so brilliant that all parts of Hawaii were lighted up, and even on the Island of Maui, at a distance of 180 miles, the glare was so great that the planters of West Maui thought a great conflagration was taking place on their own island.

As seen from a north-easterly direction, the several columns of fire appeared as one, thus showing that the rent from which they proceeded lay in a north-easterly and south-westerly direction. These fire-columns lasted only about six hours, but two streams of lava began to flow down the mountain towards the south, and continued to move slowly down for two days, when they united and abruptly disappeared in the earth, and all external signs of activity ceased. On the 24th, at 3 A.M., the natives living on the coast at Karakakoa Bay, 40 miles west of the mountain summit, saw, about a mile out at sea, what appeared to be innumerable lights—red, blue, and green,—and at daylight a large area of water appeared agitated, as if boiling, and giving off quantities of steam. To the passengers of an approaching steamer it appeared as if a numerous school of whales was at play—blowing and splashing. A boat sent from the steamer rowed about over the most active part, and found that quantities of lava were being ejected by this submarine volcano, which, on coming into contact with the water at a depth of from 20 to 50 fathoms, formed itself into masses of various sizes, some as big as good-sized casks, all more or less globular in form, and composed of a vast number of cells of hot lava, each filled with steam and sulphurous gases. These rise to the surface hot and hissing, and some of them containing a core of lava still in a state of fusion; after a time, its gases given off, its heat dissipated, it becomes gradually saturated with water, breaks and sinks. The lava is expelled from the bottom in such quantities that the boat was bumped by the rising blocks no less than six times in a minute, and it was estimated that an area of two or three acres was kept covered by pieces of lava whilst still capable of floating. One singular feature of this great phenomenon is that no volcanic eruption has been known in that district of Hawaii—at all events, within the reach of tradition—at least a hundred years. This lava, no doubt, comes from the summit-rent, and has travelled to the coast by subterranean passages. The submarine vents extend from point Ke-ei, about a mile out in a W.N.W. direction, about two-thirds of the distance across Karakakoa Bay, and a rent or crack has been traced some miles inshore in the opposite or E.S.E. direction. Were this outburst to form a natural breakwater on the line now occupied by floating lava, this open bay or roadstead would be converted into a magnificent sheltered harbour, such as Hawaii is greatly in need of, but does not possess. H.M.S. 'Fantome' is now on a cruise round Hawaii, and will no doubt bring us further particulars. H. W. Mist, Cap. R.N.

Honolulu, Sandwich Islands, *Feb.* 27, 1877.

———:o:———

BAROMETRICAL HEIGHTS IN THE AMAZON VALLEY.

To the Editor of the "Geographical Magazine."

Sir,—Perhaps you will give me space for some remarks on Colonel Church's interesting article in your April number, and particularly as to barometrical determinations of height in the Amazon's Valley. As a test of these, Colonel Church takes the height of Manáos as given by different observers, who certainly differ not a little. The lowest on his list—92 feet—by Messrs. Azevedo and Pinto (of the Brazilian Frontier Commission, I believe to be a thoroughly good barometrical determination. Colonel Church seems to think even this height too great, because the tide reaches more than half way to Manáos, though the tidal rise at Pará is only 12 feet. But in this Colonel Church treats the tidal rise up a river as one of level only, neglecting the momentum; on which principle, the tide ought to rise in the Bay of Fundy no more than it rises in the Atlantic outside. I believe that up most rivers it rises higher than at the mouth; though, of course, usually, not much higher. Professor Orton's 199 feet is a fair sample of what a careful observer with a good barometer, but no corresponding observations at a base-station, with little or no local knowledge and some bad luck, may obtain. Professor Orton's bad luck was this, that he was at Alanaos in December, when the barometer is just about at its lowest; but in almost any month a traveller on the Amazons might chance to find the barometer lower (instead of higher) as he comes down the river. Thus at Manáos in 1866 (9 a.m.), I had barometer (at 32°) February 4th, 29.974; February 10th, 29.815; and a traveller at Tabatinga on February 4th, and at Manáos on February 10th, would have had a paradoxical result. Herndon's 1475 feet is worth recalling as a curiosity only. His boiling-point thermometer gave 434 feet at Nanta (about the usual amount); but at Teffé, 2052 feet; at Manáos, 1475 feet; and at Santarem, a place reached by the tide, 846 feet!! I have often tried to, but never could, divine the cause of these strange results. Once I asked Mr. Casella, but he could only suggest imperfect boiling.

Of the barometrical heights on the Madeira and Purûs, I will first criticise my own, as then I shall be more free to criticise those of others. My 107 feet at Conotama (590 miles up the Purûs) is doubtless too small a height. The observations, then, in 1864, were certainly affected by the "friagem"* or cold weather, which always brings a very high barometer, and seems to be more powerful to the west and south-west; and thereby to vitiate all barometrical heights, *even from simultaneous observations*. From my observations at Canotama in 1865, compared with monthly means at Manáos (my own and of the Frontier Commission in other years), I have found 140 feet above the sea as the value. This, I think, still too little; but the observations will give no more. Similarly I obtain at 1792 miles up the Purûs, instead of

---

* For a description of the "friagem," see *Naturalist on the Amazons*, vol. ii., p. 224. During a "friagem" in July 1867, simultaneous observations of mine at Teffé, and of Captain Costa Azeveda, at Manáos, with all comparisons and reductions duly made, gave the level of the river at Teffé lower than the level of the river at Manáos.

1088 feet, almost exactly 1000 feet; but 20 feet[*] or so should probably be added for the difference of latitude, in receding from the "equatorial depression." Other observations I have not re-calculated. When monthly means are used for comparison, the extreme error probably, I estimate at about 80 feet, and the average error to be expected (with neither good nor bad luck) about 40 feet; these, however, may be a little increased by the general meteorological conditions far up the affluents of the Amazons being somewhat different from those on the main river.

On the River Madeira, the Messrs. Keller[†] used two aneroids and boiling-point thermometers. Probably their observations are not sensibly less accurate on this account; for on the Amazons (I have found) aneroids agree very exactly with the barometer, and, as General Strachey says, "an exaggerated refinement in observation has no real value." I cannot see any mention as to how their observations were calculated, *i.e.*, with simultaneous observations elsewhere, or an assumed barometrical value at the sea-level &c.; and upon this point must depend very much the accuracy of their results; and, therefore, of any opinion founded on those results as to the relative level of the valleys of the Madeira and Purûs. A supposed difference of level of 100 feet might disappear, or be doubled, if the Messrs. Keller's results shall be in error as much as mine, I consider, may be, and in an opposite direction.

Lieutenant Gibbon gives the junction of the Tona and Piña-Piña as 1377 feet (Colonel Church, by mistake, quotes 1337 feet) above the *Pacific* Ocean. Probably a better absolute result, and certainly a better one for comparison with mine on the Purûs (about 135 statute miles distant), may be obtained by calculating Lieutenant Gibbon's observation with reference to Manáos, rather than to the Pacific coast, where the climate is very different. Of course there may have been some slight difference in the zeros of the barometers used, but I believe the meteorological will much outweigh the instrumental error. I find, then, the mouth of the Tono 1520 feet above the Atlantic, and about 500 feet above the highest part of the Purûs I reached.

Whatever the value of these re-calculations, they, at least, show, as Colonel Church says, "that no absolute dependence can be placed upon the accuracy of the elevations given to us by the various explorers of the Madeira, the Mayutata, and the Purûs."

As to the relative importance of these rivers as lines of communication. One can hardly doubt that the best way from the Amazons to the Bolivian settlements is by the Madeira; probably, also, it is the best way to the Madre de Dios and its upper slopes. The Purûs and Aquiry give an easy access to Bolivian territory, but it is territory uninhabited, and 250 or 300 miles away from any settlement. About 1870, an enterprising American, Mr. Piper, obtained from the Bolivian Government a concession of a large district on the north-west frontier of Bolivia; and in February 1871, a schooner, with some forty emigrants, arrived at Manáos, on its way to the Aquiry. The first town was to be called "Herndon;" indeed one emigrant told me he had paid his passage to "Herndon," as if it were an existing place; but I fear it has not yet been founded. From the impossibility of taking the schooner up the Pûrus, and lack of money to freight a steamer, the party broke up at Manáos, though Mr. Piper, with a few followers, went up to explore. So far as I have heard, he has not yet abandoned the plan.

On p. 98, Colonel Church speaks of the *south* branch of the Purûs at my farthest point as 40 yards wide: it ought to be the *north* branch. The south branch is much narrower. But the error is not very important. (*Royal Geographical Society's Journ.*, vol. xxxvi, pp. 109, 113.)

I am, Sir, your obedient Servant,
W. Chandless.

Proceedings of Geographical Societies.

ROYAL GEOGRAPHICAL SOCIETY.

Meeting of March 12th, 1877.

On taking the chair, the President, Sir Rutherford Alcock, informed the meeting that two papers were to be read: the first, by Mr. Buchanan, who had served as chemist on the scientific staff of the '*Challenger*' expedition, related to the distribution of salinity in the ocean, or its saltness at different depths and in different latitudes; and dealt with several interesting problems in Physical Geography, as to the dissolving power of the water, its specific gravity, its effects upon the deposits. The second paper was by Mr. Allen, of Her Majesty's Consular Service, on an interesting journey he had made into the interior of Formosa, a part of that island occupied by aborigines and savage tribes.

Mr. J. Buchanan then gave his paper

On the Distribution of Salt in the Ocean as indicated by the Specific Gravity of its Waters.

During the cruise of the '*Challenger*' the specific gravity of the water from the surface and from the bottom and intermediate depths was determined by a glass, combining the advantages of Nicholson's hydrometer with those of the one with divided scales, and the results obtained with it were accurate to 5 in the fifth decimal place. The observations were always made when the water was sensibly at the temperature of the atmosphere, the results so obtained were reduced by means of the tables of the late Professor Hubbard, of Washington, to their value at the standard temperature of 15°56· C. (60° F.), the density of distilled water at its temperature of maximum density being unity. In this way the specific gravity of nearly 2000 different waters was determined, and found to vary between 1024 and 1028, between which limits it may be assumed with certainty that the salinity varies with the specific gravity.

The distribution at the surface of saltness thus indicated was exhibited on a chart by means of differently coloured areas, and the vertical distribution was shown in the diagrams representing meridional sections of the Atlantic and Pacific Oceans respectively.

As far as the surface is concerned, the concentration of the waters of the Atlantic was found to be greater than that of either the Pacific or the Southern Oceans, and it is greater in the North Atlantic than in the South Atlantic, although the actual maximum may be slightly higher in the South Atlantic. In the North Atlantic the maximum was observed in 22° N. lat. and 40° W. long., from which point it diminishes in all directions. The maximum in the South Atlantic was 102,785 off the coast of Brazil, in 17° S. lat. In the Pacific the areas of concentration are much less pronounced, the maximum of 10,272 occurring near the island of Tahiti. In the North Pacific the maximum is under 10,265, and situated about 22° N. Between the north and south maxima in these oceans is situated the area of equatorial dilution. Following the equator from east to west in the Atlantic, the water increases markedly in saltness, as it does also in the Pacific, though in a less degree. On the polar sides of the areas of concentration the saltness diminishes as the latitude increases, at first rapidly, then more slowly. The whole of the Southern Ocean between the parallel of 40° S. and the edge of the ice appears to have a very uniform surface specific gravity of about 10,250. In the North Pacific, to judge from Leng's observations, it is lower, and in the North Atlantic higher.

If we consider the water below the surface, as shown in the vertical sections, we find, in the Atlantic, that in the concentration areas the specific gravity diminishes until a minimum is reached at a depth of about 800 or 1000 fathoms, after which it increases slightly down to the bottom, where, in the South Atlantic and in the Pacific, a tolerably uniform specific gravity of 10,257 to 10,259 is observed. In the areas of equatorial dilution the specific gravity first increases to a maximum at a depth of 50 to 100 fathoms, after which it follows the same law as the water north and south of it. In the North Atlantic the bottom specific gravity is comparatively high. In investigating the causes of the variations in specific gravity in the ocean, we find that they depend on the means available for removing or supplying water. Thus the areas of greatest concentration coincide with those where the dry trade-winds are constantly blowing, taking their rise in the lower temperate latitudes, and proceeding in their course always from colder to warmer regions, so that, for the first part of their journey, at least, although they are continually taking up moisture, their capacity for doing so is continually increasing. Hence the great concentration of the water in the steady trades of the Atlantic. On the other hand, the westerly winds of the higher temperate latitudes which take their rise at the same source, proceeding in the first part of their course from warmer to colder latitudes, are soon comparatively saturated, and incapable of concentrating the waters over which they blow. The moisture taken up by the trades is wrung out in the equatorial calms, where it descends as heavy rains, and dilutes the sea water. Comparing the salinity of the sea surface with the distribution of barometric pressure, we find that the maximum of saltness lies in the northern hemisphere to the south-west, and in the southern hemisphere to north-west of the barometric maxima. Concentration is also brought about by the formation of ice, and in regions where more ice is formed in winter than melts in summer, which in the southern hemisphere would enclose a very large area, the effects must be cumulative. In the Southern Ocean the specific gravity of the bottom water was always much higher than that of the surface.

---

[*] Sir J. Herschel's *Meteorology*, § 163.

[†] *Vorn Amazonas und Madeira*, p. 144.

The high-bottom specific gravity in the North Atlantic depends not only on the lake-like form of the basin in which the water is kept by tangential winds and currents from getting out of the concentrating effects of the trade-winds, which effect is propagated downwards to a great extent by the difference between the summer and winter temperatures, but also on the fact that all the accumulations of salt brine from the Mediterranean are emptied into it through the Straits of Gibraltar. It is probable that a similar effect is produced on the Indian Ocean by the proximity of the Red Sea.

The observations make it probable that in the Atlantic the water from the surface, down to a depth of 1000 fathoms, has on the whole a flow *inwards*, or from south to north, and below that depth and down to the bottom it appears to have an opposite flow, thus providing for the removal of the salt which otherwise would accumulate in the North Atlantic. The Atlantic thus presents on a larger scale what is observed in the Mediterranean, where the mean drying power of the atmosphere is higher than even the North Atlantic. In the Pacific, owing to its form and general climate, these conditions are not so evident.

After a few remarks from the President, Mr. Allen proceeded to read his paper

On a Journey through Formosa from Tamsui to Taiwanfu.

At the invitation of Mr. Mackay, of the Canadian Presbyterian Mission in the north, and Mr. Ritchie of the English Presbyterians in South Formosa, to accompany them on a tour to their respective stations, Mr. Allen started in November, 1875, from the old Dutch fort at Tamsui. Crossing the harbour near its entrance, and skirting the western side of the Kuanyui Hill, 1720 feet above the sea, they gained the table-land which stretches some 30 miles down from the coast. The plain was covered with paddy and sugar-cane crops, and heavy four-wheeled carts, generally drawn by a buffalo, with two of the ordinary black cattle on each side were constantly met with. About 8 miles from Tekcham, which is the capital of Tamsui, they reached Table Hill, or Windmill Slope, the termination of the plateau, and got a good view of the sea to the westward, and, descending, crossed the river in a flat-bottomed boat. Passing through the large towns of Heongsan and Tiongkong, and leaving the large town of Oulan on their right, they came to Suikang, which is the last of Mr. Mackay's stations, where they were warmly received by the catachist of the chapel. Most of the converts in Suikang are Pepohuans, are found generally established in small colonies between their Chinese conquerors and their brothers, the wild aborigines of the interior, and are a simple minded and quiet people. Leaving Suikang, and making a midday halt at Tunglowan, they travelled up a long and very pretty valley, then over a small range of hills, and next came to the colony of Laisia, the population of which is entirely Christian and numbers about 200. Passing through the village of Siutiam, and travelling along the base of the hills, over a plain some miles wide, strewed with rocks and boulders, Mr. Allen and his companions arrived at Toasia. Proceeding S.S.E. for 13 miles over a fertile plain, cultivated with sugarcane, tobacco, ground nut, sweet potatoes, &c., they gradually approached the range of hills which lay to their left. At the head of the gorge due east of the district town of Changhua, they were met by a party of about forty Pepohuans who were to act as their body-guard through the mountains. The gorge wound a good deal, with a thick jungle on both sides, which the Pepohuans occasionally set on fire. As they proceeded the pass became narrower, until they reached a point where a big camphor tree almost blocked it up, the width being only five feet. Mr. Allen described the scenery as magnificent, the mountains rising 2000 or 3000 feet, almost perpendicularly on each side, were covered with camphor and other forest trees. One or two veins of coal were noticed on the rocks, and a stratum of conglomerate pebbles in the clay, 600 feet above their heads. At the end of the gorge the ranges of hills opened out, and although they occasionally had to cut their way through the jungle, travelling was much easier. A small edible, acid fruit, resembling a raspberry was found here, as well as a sweet smelling fern, which the natives called Tanpa; but no savages were met with. The fertile, and well-watered plain of Posia, with a population of 5000, was next reached, and here they remained five days. Mr. Allen was shown an electro-plated silver cup, about two inches long, which an old man assured him had been an heirloom in his family for 200 years; but from some marks on it, he believed it to be an old Dutch matchbox.

Resuming their journey through another pass to the south they came to the beautiful lake of Tsui-sia-hia, or lake of the Water Savages, a distinct tribe who live on its banks. They are a degraded race, and are employed as slaves by the Chinese; they tattoo their faces in bands across the nose, are tall, and would be well-proportioned but for a pernicious habit they indulge in of tying cloths tightly round their waists, which deforms them very much. Travelling in a south-westerly direction over the hills, their next halting-place was Chipchip, which is entirely Chinese, and is the head-quarters of a mandarin. A number of villages were passed, one of which, Limkepo, is said to have a population of 3000. The valley through which they travelled wound about a good deal, and it was dusk before Toulak, their next resting-place was reached. The main road was struck at Tapona, and passing a few villages, the largest of which was Tamao, they arrived at the Mission Chapel at Kajee, and being within two days' journey of Taiwanfu, Mr. Allen bade adieu to his companions, and on the nineteenth day, after a journey of 220 miles, reached Taiwanfu.

A short discussion followed the reading of this paper.

Meeting of March 26th, 1877.

Sir Rutherford Alcock, President, in the Chair.

The paper of the evening was by Sir George S. Nares

On the Navigation of Smith Sound as a Route towards the Pole.

This interesting paper appears as an article in our present number, see p. 119, to which we beg to refer our readers.

——:o:——

IMPERIAL RUSSIAN GEOGRAPHICAL SOCIETY.

The monthly meeting of the 2nd (14th) March took place under the presidency of M. P. de Semenof. The Secretary announced the commencement of three new works under the auspices of the Society. The first of these is an ethnographical description of the regions of the Upper Oxus, the Hindu Kush, and the Himalaya. M. Veniukof proposes to summarize, in the Russian language, the ethnological information afforded in the works of Burnes, Wood, Shaw, Hayward, and others respecting these regions, as well as that derived from Russian sources such as Abramof, Grebenkin, Kuhn, Fed chenko, Scobolef, and from the works of Klaproth. Abel de Remusat, Stanislaus Julien, Palladius, &c. M. Veniukof proposed to illustrate the work by an ethnographical map and a vocabulary.

The committee charged with the duty of examining this proposal reported very favourably on it, and recommended the preparation of a succinct account of the geography and ethnography of the lands about the sources of the Oxus, the Yarkand Daria, the Indus, and the Cabul Daria, as well as of a complete reference to all works bearing on the subject.

M. Veniukof's scheme met with like approval from the Council, but it has unfortunately been found imperative to defer its execution for financial reasons. M. Minaief has, however, undertaken the duty of accumulating materials.

Another scheme which met with favour, but which was not submitted in a detailed form, was proposed by M. Maïnof, and dealt with an ethnological study of the Finars, inhabiting the banks of the Volga, among whom he had made investigations, traversing, in the course of his work, parts of the Governments of Tver, Nijni-Novgorod, Tambof, Penza, Simbirsk, and Saratof. This scheme, on examination, was somewhat reduced in scope, so as to deal exclusively with the Mordvas and their ethnology.

The third scheme suggested to the Society, referred to a survey of the rapids of the Angara River, which when discovered by the Cossack Ivanof, in 1643, had long been a great commercial highway, and has preserved that character up to recent times. At present there is scarcely any navigation except between Irkutsk and Bratsky-Ostrog. This project, which is proposed by M. Sibiriakof is now under consideration.

Lieutenant Opotsevitch of the Imperial ship 'Vsadnik' gave an account of his hydrographical labours in the Sea of Okhotsk, Behring Sea, and the Arctic Ocean to the north, and M. Paschine related his travels in Burmah.

——:o:——

PARIS GEOGRAPHICAL SOCIETY.

March 7th, 1877.—M. E. Levasseur in the chair. The President announced the death of the Marquis de Compiègne, recalling the great services which he had rendered to geography.

M. H. Tarry, in a letter written from Rome, draws attention to the recommendation of synchronous meteorological observations to be made throughout the world at 12.53 p.m., Paris time, and desires that instructions to that effect should be given to the travellers supported by the Society.

M. Simonnin supplied some information on the Geographical Society recently established at Marseilles. It publishes a monthly *Bulletin*, causes geographical lectures to be delivered, and proposes to found an Industrial Museum.

Dr. Harmand, of the French Navy, read a paper on the Mois, a tribe inhabiting the district bounded by the Don Nai, and its tributary, the Song-be, in Cochin China. They are a mixed race, and can hardly be called savages. They have no religion, but believe in evil spirits, and every act of importance is preceded by a propitiatory sacrifice. No animal is killed without a bundle of bamboos being suspended to the roof of the house. Their houses are built on piles, about two yards in height. Their arms consist of cross-bows and cutlasses. The chiefs carry a weapon consisting of a long broad blade of iron and an iron attached to opposite sides of a wooden handle, which is used indifferently as a sword or a javelin, and with which they attack the elephants. Their forests are almost inaccessible during the rainy seasons, and blood-thirsty leeches abound in them.

M. Ch. Cotard furnished a few particulars on the late M. Oliver Bixio, who died at Darien on the 8th January, 1877.

M. Bonnat rendered an acount of his explorations in Ashanti and on the River Volta. He spoke highly of the Ashantis, whom he looked upon as the most civilised of all negro tribes. He proposed to return to Western Africa on the 17th March.

The President announced that the Grand Medal of the Society had been awarded to Commander Cameron, a Gold Medal to Captain Roudaire, a Silver Medal to MM. Folin and Périer for their work, *Le Fond des mers*, and the Gold Medal founded by M. La Roquette to M. Gabriel Gravier, for his work on ancient voyages to the Arctic Regions.

——:o:——

BERLIN GEOGRAPHICAL SOCIETY.

January 6th, 1877.—Dr. Bastian in the chair. The President announced the death of Dr. K. E. von Baer, one of the honorary members of the Society, and of Dr. R. Avé-Lallemant, of Lübeck, the author of several important works on Brazil. Dr. Reiss, just back from his geological exploration of South America, was present. Amongst the works presented are a plan of Old Jerusalem, published by the German Society for the Exploration of Palestine, recently founded at Basel; a work on Bosnia, by Herr Blau, with a map by Dr. Kiepert; and the first volume of Baron Richthofen's work on China.

Dr. Oscar Loew read a paper on Lieut. Wheeler's expedition to the south-western portion of the United States, to which he had been attached as geologist.

Dr. P. Ascherson read a paper on the Little Oasis, which he visited in spring last.

February 3rd, 1877.—Baron Richthofen in the chair. Dr. Lenz reported on his three years' exploration in the Ogowé country.

Dr. Pogge delivered an address on his journey to Musumba, the capital of the Muata-Yamvo. He described the climate as healthy, and thought that the route followed by him would prove advantageous to future explorers. From information collected by him it would appear that the Kassai is the main branch of the Congo, and that the Lualaba has no connection with that river, but flows north in the direction of the Ogowé. The Congo in Loando, was known as Nzare.

March 3rd, 1877.—Dr. BASTIAN in the chair. The Chairman announced that Geographical Societies had been established in Denmark and Belgium, and that the Bremen Polar Society had transformed itself into a Geographical Society. No trustworthy information had been received hitherto about the death of Herr E. Mohr, who was in perfect health when Dr. Pogge parted from him at Pungo Andongo. The reported murder of the traveller did not appear to him deserving of credit. Mohr's death had seriously interfered with their plans of exploration, but the cause in which he died would not be relinquished. Even now Dr. G. Nachtigal was seriously considering whether to step into the breach.

Letters were read from Dr. E. VON BARY, who was now exploring the geology of the Sahara.

Baron THIELEMAN, the Secretary of the German Embassy at Washington, delivered an address on the North American Indians. He said that our European notions with respect to them, based as they were upon novels and the statements of partizans, were altogether erroneous.

Dr. COCHINS then read the second part of his paper on Japan.

March 7th, 1877.—Dr. BASTIAN in the chair.—The Emperor of Brazil was present. The President, in alluding to the Geographical Society recently founded at Rio de Janeiro, said that the thorough exploration of South America offered an ample field for its activity. He announced the death of two of the members, Drs. Braun and Osrehmiker, and of the Marquis de Compiègne, who had fallen in a duel at Cairo. He also invited subscriptions towards a monument of the mathematician Gauss to be erected at Brunswick.

Captain Baron SCHLEINITZ then read a paper on the natives of M'Cluer Gulf in New Guinea and of Melanesia, which he visited during the voyage of the 'Gazelle.' He could not confirm the view, that, with the exception of certain coast districts, where a mixture with Malays had taken place, the population consisted of true Papuans. On the contrary, the true Papuans of the interior of New Guinea, differed very much from the inhabitants of Northern Melanesia. The complexion of the natives of New Hanover and New Ireland was a rusty brown, and sometimes hardly darker than that of Southern Europeans. They were altogether a superior race, as regarded build, and only in the southern portions of New Ireland and New Britannia did they resemble the Papuans met with in North-Western New Guinea. They were split up into innumerable tribes, all of them talking different languages, and holding scarcely any communications with each other. In their frail canoes they dare not venture upon the open sea. The men wear no clothing whatever, while the women content themselves with a string round the waist or a small apron made of bass. The women cut their hair short, and protected themselves against the rays of the sun by wearing pandanus leaves. They wear ornaments of pearls, shells, the teeth of animals, and tortoise-shell. The chiefs stick feathers into their hair, and sometimes wear collars ornamented with rows of teeth, &c. Much attention is paid to the dressing of the hair. Sometimes one-half of the head is dyed red, the other white, and the top yellow. Immense wigs were also worn, particularly in New Britannia, and teeth, thorns, and other articles are stuck through the wings of the nose.

The natives on M'Cluer Gulf were in part mixed with Malays. They were dolichocephalous and their average height was 1·595 metre. Their shyness, and the hostile attitude which they assumed upon the approach of Europeans, were explained by the slave-hunts formerly carried on by the Sultan of Tidore.

———:o:———

VIENNA GEOGRAPHICAL SOCIETY.

February 27th, 1877.—BARON HELFERT in the chair. Dr. R. von DRASCHE-WURTINBERG read a paper on his travels in the Philippines and Japan, which was illustrated by the ethnographical collection presented by him to the Imperial Museum.

Herr. Franz RZIHA gave a description of a mountain-slip at Steinbrück, illustrated by maps and photographs.

———:o:———

HAMBURG GEOGRAPHICAL SOCIETY.

March 1st, 1877.—HERR L. FRIEDERICHSEN in the chair. The Chairman, in announcing the death of the African explorers, E. Mohr and Baron Barth, expressed the opinion that the former had succumbed to disease, and that his reported murder would turn out to be a fiction.

Professor K. WIEBEL read a paper on submarine earthquakes and their causes.

The Chairman exhibited a new topographical map of Hamburg and its environs.

The election of the Council then took place. Dr. Kirchenpauer remains President, and amongst the other members are Professor Neumayer, L. Friederichsen, C. Godefroy, jun., Dr. L. Harms, and Dr. G. Rümker.

April 5th, 1877.—Dr. KIRCHENPAUER in the chair. Dr. NEUMAYER, in presenting the first meteorological report of the German Naval Observatory, remarked these reports would be issued in future every month. He then read a paper on recent explorations in Australia.

Herr FRIEDERICHSEN presented the society with a summary of Stanley's letters, recently published in the *Daily Telegraph*.

———:o:———

PORTUGUESE GEOGAPHICAL SOCIETY.

March 27th, 1877.—The Portuguese Government having declined to appoint a Commission to co-operate with the International Association for the Exploration of Africa, the Society appointed fifteen of its members to act as such, under the presidency of the Viscomt de San Januario.

———:o:———

THE SPANISH GEOGRAPHICAL SOCIETY.

THE Geographical Society of Madrid issues a monthly *Boletin*. We noticed the first, which appeared in July 1876, in our number for February, p. 43, and we have now received the issues for August, September and October. The August number opens with a memoir by the acting President, Don Francisco Coello, on the present state of geographical work throughout the world, commencing with an account of the Spanish surveys, and of their progress. A topographical survey was commenced in 1857, and the greater part of the cadastral survey of the province of Madrid has been completed, together with a system of levelling. The work was disorganized in 1866, owing to financial difficulties, and little progress has since been made. At the same time, a system of secondary triangulation has been completed in the Provinces of Madrid, Cadiz, Cordova, and Seville; is well advanced in those of Albacete, Jaen, and Malaga; and has been commenced in Toledo and Guadalajara. The Geographical and Statistical Institute, under the direction of Don Carlos Ibañez, has commenced the publication of a map of Spain, based on the Topographical Surveys, on a scale of $\frac{1}{50000}$. Three sheets have already been engraved, which Señor Coello believes will be found equal, both as regards accuracy and execution, to the best publications of the kind in Europe. Señor Coello then refers to the hydrographic labours of the Spanish navy. The coasts of Spain were originally surveyed by Tofino, in the end of the last century. The charts have since been revised, and portions of the coast have been re-surveyed. Captain Don José Montojo has completed a survey from the Guadiana to the Portuguese frontier, in connection with the shore triangulation, and the results have been published in five sheets. Charts of the Guadiana, of the Guadalquiver, as far as Seville, and plans of Algeciras and Malaga have also appeared recently. The map of the Island of Cuba is in course of publication at Habana, by Don Estevan Pichardo, in thirty-two sheets, on a scale of $\frac{1}{200000}$, and fourteen sheets have already appeared. In the Philippine Islands, the hydrographic work has been under the superintendence of Don Claudio Montero, and the survey is completed with the exception of part of the east coasts of Luzon, Somár, and Mindanao. The most recent work has been the survey of Joló and the Tani-tani group. Use has been made of foreign surveys, especially of those by Captain Bate, of Palawan Island, in compiling the Spanish charts. The recent Spanish publications have been a general chart of the Philippines, in two sheets, sixteen sheets on a larger scale of coasts and islands, and many plans of ports and anchorages. The Hydrographic Department publishes an annual Report, which is now in the fourteenth year of its existence, and is preparing a general index of all the manuscripts preserved in its archives, which will be a work of great value and importance.

In 1849 the first Commission was nominated for the publication of a geological map of Spain, and soon afterwards the maps of the Provinces of Madrid, Segovia, Palencia, and Valladolid appeared under the able superintendence of Don Casiano de Prado, the first among Spanish geologists. In 1854, appeared those of Alicante, Valencia, and Castellon, by Don Frederico Botella, and in 1858, the geological description of the Province of Oviedo appeared, being the work of Don Guillermo Schulz. In 1864 Casiano de Prado published his geological account of the Province of Madrid, and a geological map of the mountains of Palencia. In 1874 followed the geological memoir of the Province of Zaragoza, by Donayre. In 1870 a new geological commission was formed, and in 1873 Don Manuel Fernandez de Castro was placed at its head, since which time there has been considerable progress. The *Geological Boletin* contains bibliographical notes on the origin and progress of geological studies in Spain, and memoirs on the Provinces of Almeria and Cuenca by the engineer Cortazor. Finally, Federico de Botella has compiled a general geological map of Spain and Portugal, on a scale of $\frac{1}{1000000}$, which will soon be published.

There is also a Commission for the preparation of a forest map of the Peninsula, under the superintendence of Don Francisco Garcia Martino, the Inspector-General of Forests. The object of this work is to determine the area and position of forests, to establish the proper extent of forest lands with reference to the necessities of each region, and to separate the cultivable from the forest lands. For this purpose the orographic system of the peninsula has been studied, and the fuel and timber producing trees have been noted with regard to the climate each requires, and to their areas. Some progress has already been made in the collection of forest statistics.

Under the "Junta Estadistica," there is also a hydrological survey, which has already published memoirs on the basins of the Guadalquivir and Ebro Rivers, accompanied by maps. The War Office ("Deposito de la Guerra") has completed itineraries of the principal roads, accompanied by descriptive memoirs and various other maps; and Señor Coello concludes his review of the geographical progress of Spain by noticing the marked improvement in the educational publications of late years. He then passes in review the geographical work that has been achieved by other countries during the year. Among the travellers and explorers in Persia there is one Spaniard, Don Adolfo Rivadeneyra, who has extended his journeys through the Provinces of Laristan and Kerman, and whose map and narrative will appear in a future number of the *Boletin*.

In addition to the important address by Señor Coello, the second number of the *Boletin* contains a notice of Don Fermin Caballero, the first President of the Society, whose lamented death took place almost immediately after his election. He was chosen President on the 24th of March, and died on the 17th of June, 1876. Señor Caballero was born at Barajas de Mello, near Cuenca, in 1800, and after studying law at the University of Madrid, devoted himself especially to botany, agriculture, and geography. In 1822 he became Professor of Geography in Madrid. He published manuals of the English language, of geography, and of botany, lives of celebrated natives of Cuenca, a little work on agriculture, for the use of the people of Barajas, his native village, and many other works. On the formation of the Spanish Society, this distinguished man of letters, and ardent geographer, was unanimously chosen as its first President. He has been succeeded, as acting president, by the learned Don Francisco Coello.

The third number of the *Boletin*, for September 1876, contains an account of a visit to the Troad, in 1871, by Don Juan de Dios de la Rada y Delgado; a paper on the hieroglyphics engraved on volcanic rocks in the Canary Islands, by M. Sabin Berthelot, and two strictly scientific articles.

In the October number we have a valuable series of papers on the Philippine Islands, by Don Claudio Montero, one of the Vice-Presidents of the Society. These papers are of the nature of a monograph. The first commences with a review of maps and charts of the islands, in which our own surveyors, Captains Bate and Chimmo, receive their fair share of notice. Señor Montero then proceeds to give a succinct but very interesting history of the Spanish expeditions, which discovered and settled the Philippine Islands; of Magellan, Loaisa, and Saavedra, of Villalobos, and of Legazpi, the founder of Manila, who formed the first permanent colony. In the second paper there is an account of the Muhammadan Malays of Mindanao and Joló, and an account of these islands. This number of the *Boletin* also contains translations of the review of Bancroft's *Races of the Pacific States*, and of an article on Fergana, from the *Geographical Magazine*.

NOTICE.

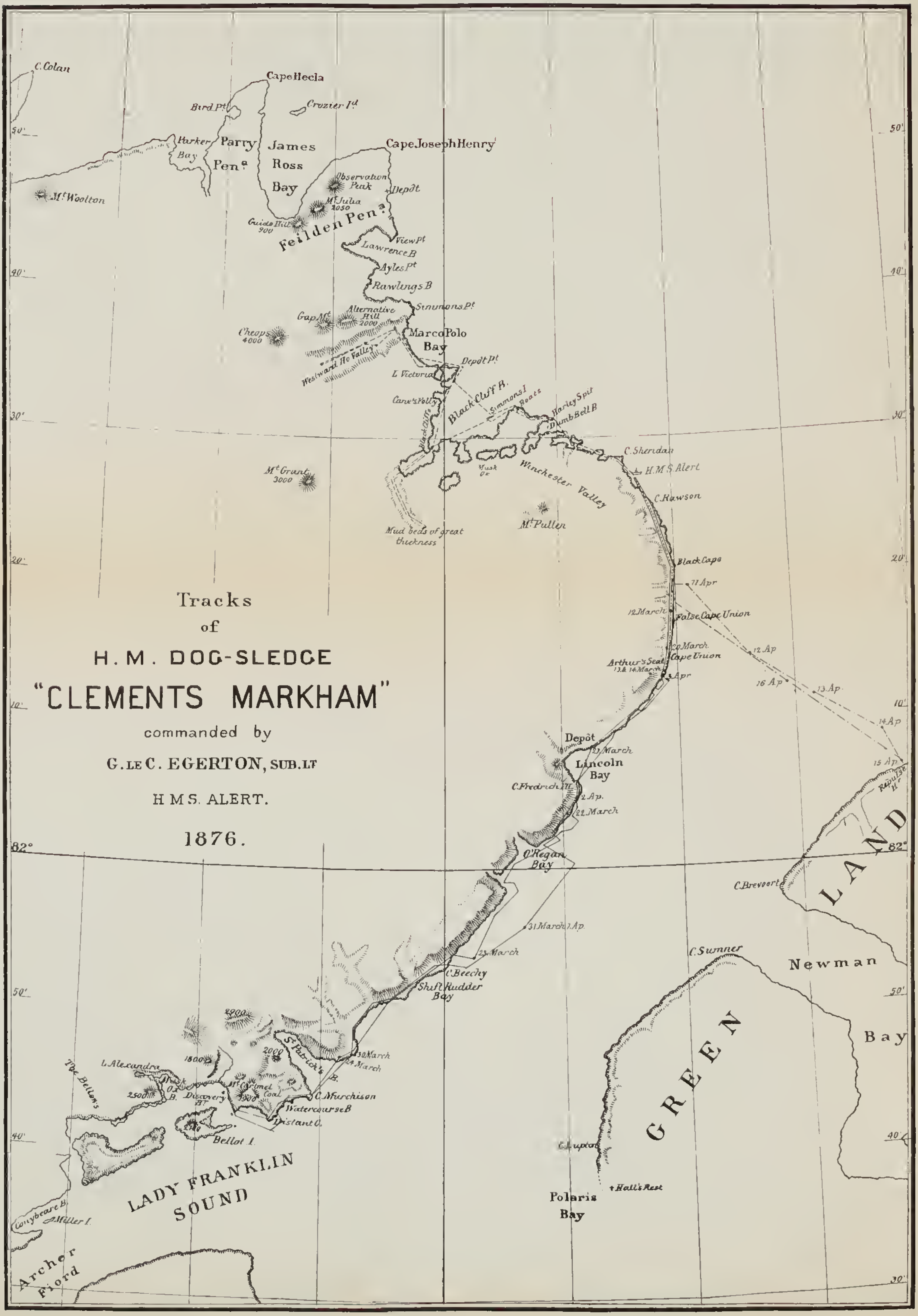
The Office of THE GEOGRAPHICAL MAGAZINE *is at* 57 *&* 59, *Ludgate Hill, E.C.*

Manuscripts sent to the Editor cannot be returned, nor can the Editor be responsible for them.

Letters and Articles intended for insertion should be written on one side of the paper only, and must be accompanied by the name and address of the writer; not for publication, but as a mark of good faith.

The right of translation is reserved.

Annual Subscription and Postage, £1, *Inland. Foreign Orders must be accompanied by P.O.O. or Cheques to include the full amount of Foreign Postage. Post Office Orders to be made payable to Messrs. Trübner & Co.,* 57 *&* 59, *Ludgate Hill, London, E.C.*



Tracks
of
H.M. DOG-SLEDGE
"CLEMENTS MARKHAM"
commanded by
G. LE C. EGERTON, SUB. LT
H.M.S. ALERT.
1876.

THE

GEOGRAPHICAL MAGAZINE.

JUNE, 1877.

THE ARCTIC EXPEDITION.

XV.

Work of the Auxiliary Sledge Parties.

(*First Part.*)

In our number for December 1876 we gave an account of the autumn travelling, and of the work of the extended sledging parties in the spring, which constituted the principal achievements of the Arctic Expedition and ensured its success; while in our number for April 1877 Captain Hamilton furnished extracts from the journals, showing what unparalleled hardships and sufferings were endured by those who so nobly performed this difficult service. We also touched upon the work done by the depôt parties acting as their supports. The admirable organisation that secured the discoveries to the eastward and westward of the winter-quarters, the advance to the most northern point ever reached by man, and the thorough scientific examination of the newly-discovered region, was based on experience acquired in former expeditions, and was very complete in all its parts. Each party that was despatched from the ships formed a necessary portion of a well-devised scheme to secure the many useful results, for the acquisition of which the Expedition was fitted out. The most important and grandest work was accomplished by the gallant extended parties of whose deeds we have treated in former numbers. It remains to furnish our readers with a record of the useful aid given by the auxiliary sledging parties led by the junior, but not less zealous and equally resolute officers of the Expedition.

The work of the auxiliary parties was to keep open communications, to pioneer, to carry out succour, and to explore, with a view to making collections and discoveries at shorter distances from the ships than would be reached by the extended parties. This work, useful and important in itself, and essential to the general success, formed an admirable training for the young officers who performed it, and who thus acquired experience which has qualified them, in their turn, to lead expeditions, and has formed them into a younger generation of Arctic experts.

The first service of the auxiliaries was one of no slight difficulty. It was to open communication between the 'Alert' and the 'Discovery' as early as possible after the return of the sun,—during a time when the mean temperature was — 30 and the minimum — 45. The heroes of this memorable exploit were Lieutenants Egerton and Rawson, with H.M. sledge 'Clements Markham' and nine dogs. They were accompanied by the Danish dog-driver, Neil Christian Petersen, and left the 'Alert' on the 12th of March.

Lieutenant Egerton tells his own story so well that we shall, for the most part, quote from his report; and our readers will thus receive an accurate and, at the same time, a vivid impression of the character of the work, and of the admirable conduct of the two young officers, who succeeded in saving the life of their unfortunate comrade.

On the first day they made 10 miles over hard snow, and all went well; but on the 13th there was a great alteration in the nature of the ice. The enormous floe-bergs which, from the winter-quarters to this point fended off the other pack, here ceased, and their place was occupied by a wall of smaller hummocks. The cliffs came down perpendicularly to the water, and a drift had formed at the bottom so steep and slippery that they had to cut channels in it for the sledge-runners, embedding the pickaxes and shovels to leeward, in order to hold the sledge if it came out of the channels. In that case it would have gone over a drop of from 20 to 30 feet on to the floe beneath.

Petersen had been frequently frost-bitten, and was becoming very ill on the 13th, and on the 14th a strong wind made it almost impossible to travel, and he became worse. After anxious consultation, Egerton and Rawson decided that it was quite out of the question he could go on, and that they must take him back to the ship as quickly as possible. But there being too much wind to travel, they encamped under Arthur's Seat, and began to make a hut in which to pass the night.

"This we did by digging a hole about 6 feet by 4, and 6 deep, down in the drift, then undercutting it about 4 feet, making it 8 feet square, and 4 feet high inside. We then covered the hole over with the sledge, and, as soon as Petersen was removed into it, with the tent. This took us six hours to complete.

"At luncheon time, as he said the pemmican disagreed with him, we gave Petersen a little 'hoosh,' made from the preserved meat, which we had for the dogs. The liquid part of this he drank, but would not eat any of the meat. About 6 P.M. he was very bad, this time worse than before; there appeared to be no heat in him of any kind whatever, and he had acute pains in the stomach and back. We chafed him on the stomach, hands, face, and feet, and when he got rather better, wrapped him up in everything warm we could lay our hands on, at the same time giving him 40 drops of sal volatile and rum, which appeared to be the only thing that did him any good. He was constantly calling for cold water, and we gave him a little now and then, but we did not think that much cold water could be good for a man who was so intensely cold, and had an empty stomach. We lit up the spirit lamp to raise the temperature, and as every crevice where an atom of air could get in was carefully closed, the atmosphere in the hut became somewhat thick; but we only succeeded in getting the temperature up to + 7. Later on we got the patient to take a little tea and biscuit, which, however, he soon vomited. We were constantly asking if he was warm in his feet and hands, to which he replied in the affirmative, but before making him comfortable for the night we examined his feet and found them both perfectly gelid and hard from the toes to the ankles, his hands nearly as bad. So each taking a foot, we set to work to warm them with our hands and flannels. As each hand and flannel got cold, we warmed them about our persons, and also lit up the spirit lamp. In about two hours we got his feet to, and put them in warm foot gear, cut his bag down to allow him more room to move in it, and then wrapped him up in the spare coverlet. His hands we also brought round, and bound them up in flannel wrappers, with mitts over all. Shortly after I found him eating snow, which we had strictly forbidden once or twice before. In endeavouring to do this again during the night, he dragged his feet out of their covering, but only a few minutes could have elapsed before this was detected by Lieut. Rawson, who, upon examining his feet, found them in much the same state as before. We rubbed and chafed them again for over an hour, and when circulation was restored (he could then bend all his toes and the joints were moveable), wrapped him up again and gave him a little cold water, for which he was begging, and he then appeared to go off to sleep; but his breathing still continued very short."

"Next day (March 15th) we began to get breakfast ready soon after 5 A.M. Petersen appeared to be rather better, though he was not fit to travel; but, thinking that it was preferable to run the chance of taking him as he was, and that by waiting he might only get worse, we determined to return to the ship. At 8 o'clock we were under weigh, taking the tent, lower robe, coverlet, sleeping bags, and one day's provisions with us (all the sugar, tea, and chocolate, and spirits of wine), and leaving behind the spare coverlet, dogs' food, and all the gear we could dispense with, covering the hut over with the sail, and leaving a staff to mark the place.

"With some assistance, and a dose of 30 drops of sal volatile and a little rum, Petersen was able to get over the first portion of the journey, which was the worst, and as soon as we got decent travelling we lashed him on the sledge and covered him over with the robes. His circulation was so feeble that his face and hands were constantly frost-bitten, entailing frequent stoppages whilst we endeavoured to restore the affected parts by application of our warm hands.

"The poor man complained considerably of cramp in the legs, but, much to our regret, we could not afford time to stop the sledge, as it appeared to us a matter of vital necessity not to lose a moment in placing him under medical supervision. At 10 o'clock we stopped for tea, which Petersen drank, but threw up, and after thawing his nose and hands, and securing him on the sledge, we again set off. On arriving at the Black Cape, we had to take the patient off the sledge, and while one assisted him round, the other kept the dogs back, which by this time knew they were homeward-bound, and it gave us no small amount of trouble to hold them in. After getting the sledge round and restoring Petersen's hands and nose (which were almost as bad again a few minutes after), and securing him on the sledge, we again set off. At Cape Rawson the same difficulties were experienced; in fact rather more, for the sledge took charge down a 'ditch,' about 25 feet deep, turning right over three times in its descent, out of which we had to drag it, and while clearing harness (which employed us both, one to stand in front of the dogs with the whip, while the other cleared the lines), the dogs made a sudden bolt past Lieut. Rawson, who was in front with the whip, and dragged me more than a hundred yards before we could stop them. But he held on to the harness all the time, and so kept the dogs. On his grip depended poor Petersen's life. At length, after the usual process with Petersen (that of thawing his hands and nose, which we did every time we cleared harness, or it was actually necessary to stop), we got away, thankful that our troubles were over. The dogs got their harness into a dreadful entanglement in their excitement to get home, but we were afraid to clear them lest they should break away from us, or cause us any delay, as we were both naturally anxious to return with the utmost speed to the ship, and so relieve ourselves of the serious responsibility occasioned by the very precarious state in which our patient was lying. Upon arriving alongside the ship at 6.30 P.M., we were very thankful that Petersen was able to answer us when we informed him he was at home."

On the 20th of March, Egerton and Rawson again started on their perilous errand, this time accompanied by two smart seamen, John Simmons and Michael O'Regan. They made 15 miles the first day, and were established in their tent by six o'clock, lighting their pipes, and, "of course, we tied up the ventilating holes, as we had no intention of letting any warmth inside escape into the cold air without." Next day, "the travelling became worse. We were keeping to the land, and the whole of the drift between the slope of the cliff and the hummocks was at a considerable angle, sometimes very steep, up and down always. The latter we did not object to, though the sledge capsized frequently, but the former gave us no end of trouble, and unless there had been four of us our progress would have been very slow, for the dogs are of little or no use in this kind of travelling, but what use they were we got out of them by constant application of the whip. Even that is no use unless one man walks ahead to lead them, while the other three, having cut a footing with a pickaxe, sit down and 'one,' 'two,' 'three,' 'haul,' until the sledge is up, when the dogs, finding the strain eased, start off at full swing down the hill on the other side. The sledge slides down a short way sideways and then capsizes, sometimes turning clean over three or four times. This style of thing went on incessantly until we became rather more knowing, and found it better for one to walk down the hill very slowly in front of the dogs with the whip in his hand. By so doing we sometimes avoided the usual capsize, being able to ease the sledge down gradually. At last we came to the conclusion that, although the pack beneath us was nothing but what is commonly called 'rubble,' being pieces of floes, somewhat rounded in shape from constant turning over and rubbing together, much resembling boulders or large pebbles in form, with small pieces between them, all cemented together by freezing, it could not be much worse than what we were then having, and determined to try it. To get the sledge down from our position, which was about 20 feet above the pack, was the first thing. To do this we untoggled the dogs, secured the drag-ropes to the back of the sledge, the tent guys as well, and then, all having got as firm a footing as possible, we lowered the sledge over. Unfortunately our backing ropes were not long enough, but there was nothing for it but to let go, trusting to Providence for the rest. The sledge, being uncommonly strong, stood the blow it received at the bottom splendidly; to get the dogs down was a very simple matter,—by the aid of a whip they soon found a way down for themselves, bustling down one on the top of the other.

"After getting the sledge over a short distance of this 'boulder' ice, we came to a lane of perfectly smooth ice running along just underneath the perfect wall of ice formed by the grounded hummocks and floe-bergs, the outer sides of which were cut as straight and polished as smooth as a piece of marble, with parallel lines cut out by the pack grinding against them when in motion. There are some enormous hummocks piled up to a height of 60 feet in places.

"The travelling over the smooth ice was excellent, but we seldom came to more than a hundred yards or so of it without hummocks intervening, which generally had to be cleared away with pickaxes. As we got further on, we found water on the top of this lane of ice, which appeared to be continuous; and the pack being too hummocky to attempt, we were compelled to take to the land again just opposite the third ravine from the cairn on Cape Union. Half a mile further on the slopes became too much for us, so we took the floe once more, preferring the 'one,' 'two,' 'three,' 'haul!' and getting something, to the same with no result.

"We took to the land again off a very large ravine trending to the northward: here the cliffs do not come down to the water-line at such a steep incline, leaving a good road between land and grounded floe-bergs. As the land trends away to the westward to form the bay, the hummocks become less in size and number.

"When we came to any good travelling, Lieut. Rawson and I walked on ahead, the dogs keeping close to our heels, while the men took it in turns to sit on the sledge and to steer. At 6.15 we reached the depôt and encamped beneath it, all pretty tired, including the dogs."

On the morning of the 22nd, "called cook at 6.30 A.M. Under weigh by 10.30 A.M. Across the bay the travelling was very fair, the line of Sastrugi running exactly in our course. Here we had a slight misfortune,—the toe of the sledge-runner caught under a ridge and sprung. As we approached Cape Frederick VII., getting under the land, the travelling became more hummocky, and the snow was just hard enough *not* to bear. Now, if there is one thing which takes it out of one more than another, it is that you tread upon a piece of snow which looks nice and hard, and as soon as your weight comes fairly on it—not just when you lift your other foot, but several moments later—down you go, sometimes up to the thigh, your teeth clatter, and you run a very good chance of breaking a leg, or being hit in the face with the knee of your other leg.

"Off the point it was far too hummocky to hold out any hopes of getting round on the ice; so we took to the land, and found it much the same as the bad part yesterday, up and down hill, hauling and capsizing continually. Once, when the sledge capsized, the backs caught against a hummock and both carried away, causing a short delay.

"At 1.40 we stopped for luncheon, and fished the sledge backs with the two spare battens. At 2.30 we started again, travelling still very bad; and at 5.45 pitched the tent, just to the northward of a ravine. Rawson sprained his wrist, so I put on a bandage. Simmons's wrist has been rather sore where it was frost-bitten some time ago, so I applied cotton wool and a bandage. The upper parts of our sleeping bags, where they are covered with canvas, were frozen so stiff that we found some difficulty in getting into them.

"We all suffered considerably from cramps in the legs during the night, more so than usual. Under both knees and up to the thighs are generally the worst places. I was cook, so got under weigh with the cocoa at 6 A.M. Turning out in the morning and rigging for the day is the worst part of the 24 hours. The first thing is to see that all foot gear is ready, and that a blanket wrapper is not under somebody else's bag: having prepared boot hose and wrappers so as to slip on as quickly as possible, off comes the warm night gear, one foot at a time, and the first thing to put on is a flannel wrapper 16 inches square, which has been drying next the skin all night; then comes the boot hose, the sole of which is perfectly hard and a good deal of frozen snow sticking to it, which sends the first chill through one's foot; next comes a blanket wrapper, which is so hard that, when tapped, it sounds like a piece of wood; this has to be put on the same as it was taken off, for the shape of the foot is so clearly stamped on it that the corners would not double over if put on any other way: as it is, the corners are tolerably hard, and one generally finds a hard place next to the big toe; lastly, put on the mocassin and kicking straps, by which time all the blood in one's body has gone into the head, the fingers are cold, and the kettle has to be supplied afresh with snow. When that is all right, the same misery as before has to be gone through with the other foot, and by the time the cook's bag is rolled up and got out of the way the water is boiling, in goes the chocolate and sugar, and then comes the brushing down. The cook puts on his canvas jumper, walks on the bodies of the sleepers in the most promiscuous manner, and having covered up all the crevices with the coverlet, brushes down the condensation, removes the coverlet outside the tent on to the sledge, and then rouses out the others, who sit up in their bags while the cook serves out the cocoa, he having first provided a spoon for each and placed the biscuit in the centre of the tent. When all are served, he puts on the stewpan full of snow to get ready for the pemmican. As soon as the cocoa is finished, and the 'blue' served out ('blue' is the name given to what is left when all have been served), all hands set to work to rig for the day, the cook keeping himself warm outside the tent the best way he can until the pemmican is ready, by which time all are rigged and the bags rolled up. When the pemmican has been discussed, if time admits, a few minutes are given for a smoke; then prayers are read, and all begin to pack the sledge, strike the tent, and clear the dogs' harness, except the cook, who cleans up the pannikins, ready for the next meal.

"The way we divided our daily rations was to have for breakfast, cocoa and biscuit, and half the allowance of pemmican; for luncheon, cold bacon, tea, and biscuit; and for dinner, tea and pemmican, and a glass of grog the last thing.

"By 10 o'clock we were under weigh. For the first 1½ mile we stuck to the land, travelling on the slope inside the hummocks; but this becoming steeper, we tried the floes again. The travelling was very rough, and we had continually to assist the dogs and sledge over the hummocks, but occasionally we got a smooth piece without any water. We came to a bay about 3 miles wide and 2 deep, which I called O'Regan Bay. The point at the southern extremity of this bay gave us no end of trouble to round; we tried the land, but found it perfectly impassable, even on foot; the cliffs are very steep, coming down to the water level at an angle of, I should say, 35°; the hummocks are shoved well up on the land, showing that considerable pressure has taken place here. We lowered the sledge on to the floe, a height of 25 feet, having cleared away with pickaxes. There being too much water on the crack, which still continues outside the hummocks, we struck out more from the land, and came to one or two very good floes, and, by mounting hummocks continually, were able to pick a very fair road.

"At 6.45 we encamped on the floe. Each night we picketed the dogs, and found it acted very well, none of them breaking adrift except 'Flo,' who managed to get out of her harness, and any other lashings we put round her, every night, but she always lay down quietly and gave us no trouble. Though the temperature was not very low, we all felt very cold, and could not get warm, do what we would; the tips of my fingers, which were frost-bitten during my last trip, from clearing harness, have become blistered, and are rather uncomfortable. We came to the conclusion that we were just beginning to find out why they lined Southsea Beach for us when we left England, though they did not know why themselves. All our mocassins, which were soled with the tops of fishermen's boots before we left the ship, have holes in them, the snow gets in and cakes, forming a pad about ¼-inch in thickness; this we found made our feet sore, so cut the soles off.

"On the 24th, after rounding numerous small points, which shut out the ship from view, we at length sighted the 'Discovery,' and gave three cheers as loud as ever we could. Our party were all in very high spirits at the thoughts of seeing our friends on board, and the prospect of a comfortable night instead of the usual cold and cramps. We were about half-a-mile from the ship when we cheered, and we could see one or two figures alongside the ship stop and look in our direction; we gave another cheer, and presently we saw all hands running out to meet us, and shortly afterwards there was shaking of hands and answering questions by the hundred. When we could get a word in we were very glad to hear that they were all well, and had spent a very pleasant winter. At 5 o'clock we were on board."

After delivering the orders, and staying on board for a few days, the same party set out again for the 'Alert' on the 30th of March; and on the 2nd of April the thermometer was — 42.

"By keeping well out (about 2½ miles) from the land, we got on very well for the first two hours, but after that we came to a regular jam. There were no more floes in sight, and our only course was to make for the land. Between us and the shore there was nothing but hummocks, so we knew we had our work cut out to get there. After an hour or so at it we picked up one or two wrinkles. Instead of cutting a broad path for the sledge we simply made a way for one runner, and then canted the sledge up, one hand preventing it from capsizing; also, instead of getting into a gap not wide enough for the sledge, it was saving time to let the dogs go *through*, and (if the hummocks on either side were not more than 6 feet high) the sledge *over* the rounded tops of the hummocks. By one of us walking ahead to lead the dogs and pick the way, two walking, one on either side, in front of the sledge to guide it, and give it a heave over to right or left as required, and to clear the lines, which frequently catch in pieces of ice (sometimes dragging the wretched dog's head almost under the sledge-runners), and the fourth man steering at the back of the sledge, we got on at a very fair pace, and reached the land at the north point of O'Regan Bay at five minutes past twelve, where we had luncheon. At 1.30 we started again, and travelled on the crack underneath the ice-wall, until we came to a slight jam, when, seeing a very nice-looking floe not more than a couple of hundred yards off, we unfortunately were tempted to try it, and found very good hard snow; but it led us gradually away from the land, and by the time we had got to the end of it we found we were a mile from the shore hummocks, with large hummocks between. Having picked out the best route, we set to work with pickaxes to make a way for the sledge, but it was not until 5.30 that we got to the land again. We travelled on the slope between the land and grounded bergs to about a mile from Cape Frederick VII., where we camped, with the temperature at — 40, and inside the tent at — 27.

"Next day (April 3rd) we knew what to expect in the way of travelling, so were not disappointed at having an hour's work to get round Cape Frederick VII. At this point there is one of the most difficult places to pass on the journey. First we had to haul the sledge up on the top of a hummock, which was about 25 feet above the floe. Down the slope on the floe side was very deep snow; so we let the dogs struggle down, and then let the sledge go after them; but it buried itself half-way, and we had to dig away the snow, and haul it out again. This occurred a second time. At the bottom there were a lot of small hummocks with deep cracks between them, covered over with snow, which we found very troublesome, the cracks being wide enough to let one in up to the waist. The travelling across the bay was much the same as we had before; and we reached the land at the northern side of Lincoln Bay, about a mile to the eastward of the depôt, at 12.20, when we stopped for luncheon. At 1.20 we started off again, and had a very good road as far as the ravine, where we took to the ice, and kept on the crack as much as possible, but occasionally were obliged to leave it, as it was too narrow to pass. These places were generally caused by pieces of very heavy floes having grounded outside the regular line of hummocks, and, having relieved the latter of the pressure, became piled up with the *débris* of the pack as it crushed up against it. At 7 P.M. we had arrived abreast of Arthur's Seat, and found great difficulty in getting the sledge over the hummocks on to the land. The lowest and best place we could find for the purpose was a straight wall of ice 10 feet high, which was so steep that we had to cut a footing in it to climb up at all. Then we cut away at the edge, and placed boulders underneath, slipped the dogs, and hauled the sledge over. Here Lieut. Rawson very nearly came to grief: trying to hold on to the dogs, they bolted with him down the other side of the hummocks, dragging him behind them head foremost."

They reached the 'Alert' on April 4th, and thus completed the perilous and difficult duty which had been entrusted to them. It must be remembered that the month of March in 82° N., as regards the intensity of mean cold, is the same as February in 75° N.; and, on the whole, the journey of Egerton and Rawson is unsurpassed in the annals of Arctic travelling. Equal cold was experienced by Mr. Kennedy and Lieutenant Bellot in February 1852, by Commander Richards and Lieutenant Herbert in February 1854, by Nares and Hamilton in March 1854, by McClintock and Allen Young in February 1859, by Payer in March 1874, and by the whole main body of sledge travellers from the 'Alert' in April 1876. But if to the sufferings from the intense cold are added the peculiar difficulties encountered by Egerton and Rawson, and that terrible night with poor Petersen, the story is one which stands alone.

It is no unimportant result of the Arctic Expedition that we should have incidents such as these to record, and to hand down to our children. Highly as we prize the geographical and other discoveries, yet, as precious results of the Expedition, all Englishmen will set an equal value on the fine qualities it brought out, and on incidents such as that of two officers keeping the circulation in the body of a stricken companion at the imminent risk of their own lives.

A few days after their return, the same two officers were selected to perform the duty of pioneering a way across the ice of Robeson Channel to the coast of Greenland, for the extended parties under Beaumont. Rawson commanded H.M. sledge 'Arrowe,' a ladder sledge 16½ feet long, with four men; while Egerton again had the 'Clements Markham' dog sledge and seven dogs. They were absent from the 10th to the 18th of April, when the cold was not so intense as on the previous journey. On the morning of the 11th Egerton observes:—"At 5.55 I was roused out for cocoa, having had the best night's rest I have experienced yet out sledging. It just makes all the difference travelling at a temperature of — 40 or — 10. In the former case it is absolute misery, in the latter, bearable; in neither comfort." There was one remarkably large floe across the entrance of Robeson Channel, which made this journey comparatively easy, and others of considerable size, all bordered by lines of hummocks from 10 to 30 feet high. The large floes were from 3 to 10 feet above the young ice, showing the enormous thickness of the Palæocrystic floes. On the 15th they landed on the shore of Greenland, the fringe of hummocks being 150 yards broad, and some of them 60 feet high. Here they established a depôt, and commenced their return journey on the next day. In mid-channel the wind was strong, and it was intensely cold, the thermometer down to — 39. On the large floes, with no hummocks for shelter, they were exposed to the full force of this wind. "We found blinkers very useful. Lieutenant Rawson, having lost his, used his prayer-book as a substitute, which he found to answer very well. We all felt intensely cold on our left sides (the weather side). My arm, which was bent steering the sledge, became so numbed that I could not straighten it." They got back to the ship in the evening of April 18th, after having efficiently performed the service on which they were employed.

The next auxiliary work was entrusted to Lieutenant May, who had suffered amputation during the winter, owing to the severe frost-bites received in the autumn travelling. He had been confined to his bed for 120 days. Nevertheless, he was ready for all the work he could get as soon as the sledging season began, and was almost constantly employed on some useful duty or other. From the 24th to the 30th of April he took command of H.M. sledge 'Clements Markham,' and went away, accompanied by Captain Feilden, R.A., the Naturalist; Mr. Wootton, the Senior Engineer; the Eskimo Frederick, and seven dogs. His orders were to explore some of the ravines, and, if possible, to find a good route from Lincoln Bay to the ship. It was considered that the neighbourhood of Lincoln Bay would be a good point whence to watch the movements of the ice in Robeson Channel; and a direct road to it would, therefore, be useful both for this purpose and also for shooting parties. May found the same difficulty as Egerton in skirting the slope at the foot of the precipitous cliffs. In some places they cut a channel for one runner of the sledge to travel along, while the four men held up the other; but there was the risk of the sledge falling on to the floe, from a height of 20 feet. On the 26th and 27th, May and Feilden were away exploring ravines for twelve hours each day, and ascertained that a passage might be found to Lincoln Bay by following the coast as far as Cape Union, and then going overland to a ridge leading to the large ravine at the head of that bay. They returned to the ship on the 30th of April.

From the 2nd to the 9th of May, Lieutenant Egerton went, in command of the sledge 'Alert' and seven men, across Robeson Channel, to leave another depôt. The men and sledge were to go on to Polaris Bay with Dr. Coppinger, who met them on the 7th, on the Greenland coast, on his way back from Beaumont's extended party.* Egerton returned with Lieutenant May, who had followed him across the channel with H.M. sledge 'Clements Markham,' and had ascended Mount Meyer, on the Greenland coast. On this occasion they were able to make sail on the sledge, and went over the large floe at a rattling pace, with great success. But Egerton was not quite so successful in his first attempt as a photographer. "Among other things taken over by H.M. sledge 'Alert' to Greenland was a photographic apparatus, which I took with the intention of getting some photographs, and of bringing them back to the ship. Never having taken a photograph in my life before, and having only had five minutes' instruction in the art, I was rather anxious to see how the result would turn out, so I persuaded May and the crew to stand while I took a photo of the camp, dogs, and crew. I was some time getting ready, focussing, &c., and got very cold. When all was ready I took the cap off, out watch, and took the time—two minutes—May getting impatient —three minutes—I burst into a fit of laughter, as I suddenly remembered I had not drawn the slide off the plate. May was furious. After a great deal of persuasion I got them to stand again, and this time everything went off satisfactorily, except that I could not find the cap to put over the lens for some few moments."

Having amused himself as an artist, and nearly frozen his sitters, Egerton sketched the headlands, while May took a round of angles. Lieutenant May tells us the sequel of the morning's work. "We were called back to the tent, when I was surprised to find that the 'Alert's' cook was doing our cooking. Mr. Egerton joined me in my tent, and then I found why the 'Alert's' cook had been so kind as to do our dirty work; for, having given us our tea and pemmican, he helped Mr. Egerton and himself, who made a very good meal, although they had not finished their own more than an hour." This is an interesting fact, and shows how very conducive Arctic travelling is to a good appetite.

The duties of placing depôts for the extended parties having been satisfactorily completed, expeditions were set on foot with a view to enabling the naturalist to take observations and make collections, and also to survey, and secure valuable results in various branches of science within a radius of 20 miles from the ship. On the 11th of May, H.M. sledge 'Clements Markham,' under the command of Lieutenant Egerton, went away with fourteen days' provisions and six dogs, accompanied by Captain Feilden, the Naturalist; Mr. Thomas Mitchell, the Assistant-Paymaster, and a good artist; James Self, a seaman; and Frederick, the Eskimo. Mr. Wootton, in command of H.M. sledge 'Sultan' (a ladder sledge) left the ship on the same day, to lay out a depôt of a week's provisions for the northern party, returning on the 20th. These parties took with them abundant supplies of lime-juice, sufficient for daily rations, yet there were two cases of scurvy. Here is an absolute proof of the absurdity of the theory that the absence of daily rations of lime-juice on the sledges which started early in April, when it could not be used, was the cause of the outbreak of scurvy. The explorers did much excellent work, examining ravines inland, ascending peaks, and making collections in geology and natural history. On the 15th they came to a ravine, about 500 yards long, and not more than 80 broad, with cliffs on either side, which formed a sort of natural gateway into a grand valley, bounded by hills, to which they gave the name of "Westward Ho! Valley." It was a mile across, and extended for a great distance in a westerly direction. From this valley excursions were made, and on May 17th Egerton and Feilden climbed to the summit of a hill 1825 feet above the sea, whence they looked down on James Ross Bay, to the westward of Cape Joseph Henry. On the 19th Egerton got a round of angles from another hill 2000 feet high; and during the trip some remarkable mud beds were observed in another valley, of great thickness, showing sections of 100 to 150 feet, containing shells similar to those now living in the neighbouring sea. Captain Feilden, when they returned to the ship on May 24th, brought back a large collection of specimens, representing the rock formations of that portion of the newly discovered region.

From the 25th of May to the 7th of June, Captain Nares went away on a surveying excursion, accompanied by Captain Feilden, James Self, John Hollins, a marine, and his servant, Spiro Capato, with H.M. sledge 'Clements Markham,' and seven dogs, under the command of Lieutenant May. This was Captain Feilden's third sledging journey, making altogether forty days of indefatigable work in collecting and observing the physical features of the country. Captain Nares went up Mount Julia, on the Feilden Peninsula, a height of 2050 feet.

From May 27th to June 3rd Lieutenant Egerton, accompanied by Dr. Moss, William Malley, and George Hodges, went away in command of H.M. sledge 'Nellie,' to obtain soundings with serial temperatures in Robeson Channel; and also to place a depôt of 50 complete rations at Cape Union, half way between the ship and Lincoln Bay, where a large depôt had been established in case of accidents. Egerton selected a place for the soundings three quarters of a mile N.W. by N. of Black Cape, where he proceeded to dig a hole through the ice—a laborious and miserably cold piece of work. The thickness of the ice was 4 feet 1½ inch, and the depth of water 32 fathoms. Serial temperatures at five different depths were then taken. Having done this work, Egerton returned to the tent, and found that Dr. Moss had shot a hare. Their game laws permitted the sportsman to have the head, liver, and heart of any game he shot as his perquisite, the remainder going to the sick or the general use of the ship. So that evening they had "*pemmican a la lièvre perquisite*," which was a great improvement on pemmican by itself.

Lieutenant May's two journeys for the succour of the northern and western divisions have already been noticed in our former article.* On June 8th, immediately on the arrival of Lieutenant Parr at the ship, he set out, in all possible haste, with Dr. Moss and James Self, and H.M. sledge 'Clements Markham,' and six dogs, laden with medical comforts, for the relief of Commander Markham's party. On the first day he went over 25 miles in 9½ hours, and on the second he joined Commander Markham and saved the lives of some of the men by his timely aid, having done the whole distance of 36 miles in 23 hours. He returned to the ship on June 14th with the gallant but sorely stricken explorers of the northern division. On the 18th, May again set out, accompanied by James Self, William Malley, and George Thornback, with H.M. sledge 'Clements Markham,' laden with medical comforts for the returning western division, and six dogs. On the first night, he made 22 miles in 9 hours; on the next, 18 miles, joining Lieutenant Aldrich on the 20th of June, and returning with him to the ship on the 28th.

---

* See our number for December 1876, p. 321.

* See *Geographical Magazine* for December 1876, p. 320.

During the month of July, Commander Markham and Lieutenant May were away on a shooting excursion for a fortnight; and Captain Feilden, with Lieutenant Parr, was also absent for a week, while Lieutenant Egerton took a party of eleven men, from the 15th to the 23rd of July, to bring back the boats which had been laid out during the autumn. This completed the work of the auxiliary sledge parties of the 'Alert'; and we propose in our next number to give an account of similar work done by the officers and men of the 'Discovery,' including the examination of the Petermann Fjord glacier, and other important services, all forming harmonious parts of the great scheme for securing the success of the Expedition. Rawson had had 92, Egerton and May 70, and Feilden 50 days of travelling, including the autumn. Rawson was away from the ships and under canvas for 139 days. In fact, officers and men were pretty well on the move during the whole season, either laying out depôts for and succouring the extended parties, or else promoting the acquisition of valuable scientific results for the Expedition.

(To be continued.)

REPORT OF THE SCURVY COMMITTEE.

The Report of the Scurvy Committee* has at last been presented to Parliament. The long delay was caused, not, as has been alleged by certain unscrupulous newspapers, because the Lords of the Admiralty felt any reluctance in publishing it, but because a "Paper on Scurvy," which the two medical members of the Committee were requested to draw up, was not submitted until the 7th of May. The Report is accompanied by the evidence of fifty witnesses. Ten have never been in the Arctic regons, twenty are old Arctics, and twenty were members of the late Expedition.

The weight of the Arctic evidence fully bears out the view we have already expressed in former numbers;† but we are surprised to find that the Report of the Committee is not in accordance with that evidence.

The Committee had to report on the causes of the outbreak of scurvy; on the adequacy of the provision made by the Admiralty in the way of food and medicine; and on the propriety of the orders given by Captain Nares for provisioning the sledge parties. Their conclusions are that the outbreak was due to the absence of lime-juice from the sledge dietaries, though they think that the long winter also had an effect on the health of the men; that the provision made in the way of food and medicine was *more* complete than that made for any previous expedition; and that the orders of Captain Nares for provisioning the sledge parties were not proper, because they deviated from a suggestion (which he was not ordered to follow, but which was simply furnished for his information) made by Dr. Sir A. Armstrong, the Medical Director General.

The first conclusion is evidently based on preconceived notions, and is in direct opposition to the weight of the evidence, and especially of the Arctic evidence. The highest living authority on sledge travelling is Sir Leopold McClintock, and his evidence is distinct that the seeds of scurvy were sown before starting from the ships, and that the issue of lime-juice on the sledge journeys would not have kept it off (3324).* Admiral Richards, Admiral Ommanney, Admiral Pullen, Captain R. V. Hamilton, and Captain Allen Young either gave similar evidence or attributed the outbreak to the exceptionally long winter. Turning to the medical evidence, Fleet-Surgeon Scott, the experienced medical officer of the 'Intrepid' in 1852-54, said that the scurvy would have broken out on the sledging journeys if lime-juice had been taken (3954), and that the outbreak was to be attributed to the effects of the long winter (3948). Dr. Lyall, the former surgeon of the 'Assistance,' in 1852-54, gave evidence that though lime-juice was useful as an anti-scorbutic, it will not prevent scurvy altogether (4306), and that the long absence of light was an important element in the outbreak (4438). Dr. Ede, the Assistant-Surgeon of the 'Assistance' in 1850-51, concurred with Dr. Lyall as regards the long absence of light, and Dr. Piers, formerly of the 'Investigator,' also bore witness that daily allowances of lime-juice during the sledging would not have averted the outbreak, because the scurvy was latent, in some form, before the men left the ship (4688).

The facts of the case fully bear out the opinions of these eminent Arctic authorities. During the autumn travelling, when the work was quite as severe, there was no sign of scurvy, while it made its appearance almost immediately after the parties started in the spring. The only difference between the two cases was that the long winter had intervened. Only the blindest prejudice could fail to see that the winter, and its attendant circumstances, injurious to health, supplied the sole explanation of immunity in the autumn and of the outbreak of scurvy in the spring. But the proofs are cumulative that lime-juice would not have prevented this outbreak. There were seven cases of men being attacked by scurvy on board, while regularly taking their daily rations of lime-juice; three of whom had never even left the ship at all (not one only, as incorrectly alleged by the Committee). In the case of two sledge parties later in the season, when daily rations of lime-juice were issued and taken regularly, there was scurvy; and in Dr. Coppinger's very able and important evidence, we again find that the outbreak of scurvy was certainly not prevented by the administration of lime-juice (2792), nor was it efficacious as a cure for scurvy. No improvement was found in men who received large allowances of lime-juice, until after they came on a diet of fresh seal meat (2974).

---

* See our numbers for February, 1877, p. 44, and April, 1877, p. 107.

† See our numbers for December, 1876, p. 322; January, 1877, pp. 3 and 15; April, 1877, p. 89; and May, 1877, p. 122.

* These figures refer to the numbered questions in the Blue Book.

Why, in the face of such overwhelming evidence, the Committee should have come to a conclusion so distinctly opposed to it, we cannot conjecture; but there can be no hesitation in preferring the opinions of the highest Arctic executive and medical authorities, headed by the revered name of McClintock, and supported by all former experience, as well as by the facts of the recent Expedition, to the unsustained notions entertained by the five members of this Committee.

The second conclusion of the Committee is that the provision made in the way of food and medicines was *more* complete than that made for any previous expedition which has proceeded on Arctic service. As a proof of this assertion a list of the provisions supplied to the late Expedition is inserted. But, obviously, this proves nothing without a similar list of provisions supplied to a former expedition, with which to compare it. The fact is, that the provision was not more complete than, but identical with that for the previous expeditions sent in search of Franklin, except that in some respects the 'Alert' and 'Discovery' were not so well supplied. In the expeditions of Austin and Belcher, the means were provided of making beer. The late Expedition had no such advantage. In Kellett's expedition very good bacon was provided instead of pork. In the late Expedition there was nothing but pork, except for the sledge parties. In former expeditions the salt beef was excellent. In that of 1875-76 it was too salt, very tough, exceptionally hard, and inferior to the ordinary salt beef used in the navy (2982).

The third conclusion of the Committee it is impossible to justify. It is that the orders of Captain Nares for provisioning the extended sledge parties were not proper! The sole ground for this extraordinary assertion is, that he did not adopt a crude suggestion made by Sir A. Armstrong to the effect that frozen lime-juice, in bottles, should be taken on the sledges in April. Dr. Armstrong's suggestions were supplied for information; in short, for what they might be worth, and not for guidance. His opinion is worth no more than that of any other Arctic medical officer, certainly no more than those of Dr. Lyall, Dr. Scott, or Dr. Piers. Captain Nares, having no reason whatever, from the experience of the autumn travelling and from the state of the health of the crew during the winter, to anticipate any outbreak of scurvy, very properly followed the best former precedents, as established by the experience of previous expeditions. When Dr. Armstrong suggested a radical change in the well-known and nicely-balanced scale of diet for Arctic sledge parties, he was bound to give some reason for the contemplated change. His neglect to do this places the whole *onus* of the outbreak upon him, if his theory be correct that the scurvy was due to daily rations of lime-juice not being taken by the sledge parties. He has since suggested that the lime-juice might have been used by mixing it with the pemmican, but he ought to have made this suggestion before the Expediton sailed. He gave no reason for the change, and suggested no method of using lime-juice in an Arctic April, but merely threw out a crude hint that it should be taken. Captain Nares, in following McClintock's scale of diet, was perfectly right from the point of view of the information he then possessed. His orders were proper and judicious, and were the same as would have been given, in like circumstances, by McClintock, by Richards, by Hamilton, or by any other leading Arctic authority. The reflection cast upon him by the Committee, in asserting that his orders were not proper, is, therefore, altogether unjustifiable.

The Report of the Committee is followed by a "Paper on Scurvy," by the two medical members, Dr. Donnet, an old Arctic officer, and Dr. Fraser, a civilian; which is divided into three sections:—1. On the Views of the Profession in regard to this Disease; 2. On Exceptional Cases of Immunity deserving of further Investigation; and 3. On Suggestions for Prevention and Treatment.

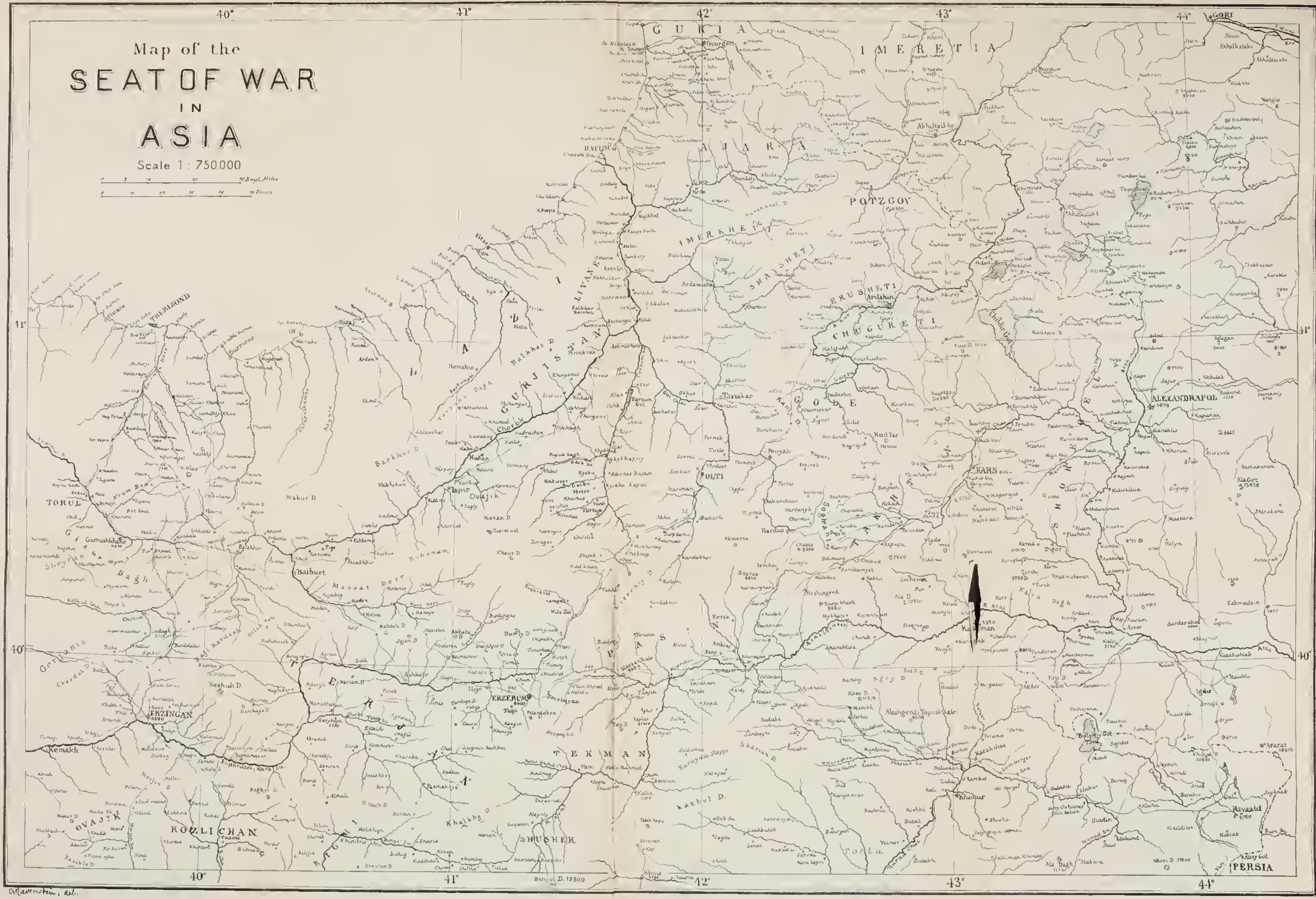
They tell us that the nature of the disease, the exact abnormal conditions which are present, and even the variations from the standard of health in the performance of many important functions during its existence, are as yet unknown. This being the case, there should be no claim to special scientific knowledge respecting a subject on which total ignorance is confessed. Great diffidence in the expression of opinions as to the best means of prevention and cure is, under these circumstances, incumbent on those who discuss the subject. It also appears that the medical profession is by no means unanimous as regards the cause of scurvy. The majority in this country attribute it to a deficient supply of fresh vegetable food, although scurvy is reported to have occurred among certain of the inhabitants, in Russia, who live entirely upon a fresh vegetable diet (2829); and Dr. Monro gave evidence of several cases of scurvy among the troops in India when on full rations of fresh vegetables. Others, including Sir Robert Christison, believe that scurvy is caused by deficiency of the nitrogenous principles of food. Dr. Garrod, and his school, refer the production of the disease to the absence of potash. Dr. Black has published his reasons for referring it to the want of heat-producing food.* Dr. Aldridge assigns the greatest influence in the production of the disease to the deficiency of phosphorus, sulphur, lime, and soda. Dr. Galloway, of Dublin, puts it down to an insufficient supply of salt and potash. Dr. Stevens held that it was caused by the use of citric acid, the chief constituent of lime-juice.† The majority of the medical profession in America scorn lime-juice as a preventive of scurvy altogether.

Thus we are met, at the outset of the investigation on scurvy, with avowed ignorance as to its nature, and with a great variety of opinions as to its cause. But the evidence now collected proves that the outbreak of scurvy in the late Expedition was due to want of fresh meat, and to the great duration of the winter darkness, with its accompanying conditions injurious to health. The difference between the number of cases in the 'Alert' and 'Discovery' is one remarkable proof, among many, of this fact. There were 45 cases among those who wintered in the 'Alert,' and 15 in the 'Discovery.' Fresh meat was served out 14

---

* See our number for January, 1877, p. 15.

† Pereira's *Materia Medica* (4th ed.) ii., Part II., p. 538.



C. Ravenstein, del.

times on board the 'Alert,' and 53 times on board the 'Discovery.' The doctors suppose that the 'Alert' only had four days of greater darkness than the 'Discovery' (p. xii.), but here again they are quite wrong. The 'Alert' had 28 days of greater darkness than the darkest day where the 'Discovery' wintered,[*] and 93 days of greater darkness than at Melville Island. The difference is enormous. Dr. Donnet and Dr. Fraser offer several suggestions which may prove useful in the equipment of the next Arctic Expedition. The most important seems to be that which refers to ventilation. They recommend the adoption of a plan which provides for the heating, to a convenient temperature, of fresh air admitted from the outside before distributing it throughout the lower deck. As regards diet, they advise the general use of eggs and of condensed milk, as well as of cheese, butter, and oatmeal. They would also provide for the liberal use of fruits, whether bottled or preserved, dry, or converted into jams or pickles. In place of spirits, they recommend sub-acid wines and malt liquors. To the sledge dietary they would add preserved milk, and would substitute beef tea for the glass of grog after supper; while lime-juice might be taken in the convenient form of lozenges.

These suggestions may be of service hereafter, and will form one useful and practical result of this expensive and elaborate investigation. But the most important result is the information contained in the valuable printed evidence of old Arctics, and of the gallant explorers of the late Expedition, whose able and judicious remarks fully establish the propriety of the orders given by Captain Nares, and disprove the theories of the Committee.

THE SEAT OF WAR IN ASIA.

Our map is intended to assist our readers in following the military operations now being carried on in Asia. It possesses but few claims to accuracy, for of the countries delineated only a small portion has been made known to us through the surveys of Russian officers and of other Europeans, some of them in the service of Turkey, besides which due allowance must be made for the short time allowed for its production.

The map embraces nearly the whole of the Vilayets of Erzerum and Van, which have an area of about 46,000 square miles and a population of 1,238,000 souls. The population is very much mixed. In the north we find Georgians or Lazi, who, unlike their kinsmen on the other side of the boundary, are Muhammadans. The centre is occupied by Armenians, stretching from Kars to Erzerum, whilst the south is almost exclusively occupied by Kurds. There are likewise Persians and Terekmins, or Kara Papap, who immigrated from the neighbouring Azerbeijan, and a large number of Turks. The various races may be estimated as follows:—

Turks	275,000
Persians	159,000
Terekmins	30,000
Kurds	474,000
Armenians	298,000
Jews	1,200

The term "Turks" has been used here in its elastic sense, and is made to include all sorts of people who have adopted the Muhammadan religion and Turkish manners. The Armenians were more numerous formerly; but about 165,000 of them, headed by their spiritual chief, emigrated to Russian territory. According to religion there are:—

Muhammadans	824,800
Christians	410,000
Yezidi	2,000
Jews	1,200

Amongst the Christians there are about 288,600 Armenians, 112,000 Nestorians, 8100 Roman Catholics, and 1300 Protestants.

A glance at the numerous altitudes inserted upon our map will convey some idea of the difficulties which the country must offer to the movements of troops, more especially as there are hardly any made roads. Deep valleys, foremost amongst which is that of the Chorok, are cut into the general level of the country, and, instead of facilitating communication, they offer the greatest obstruction to it. Mountains rise to a height of 10,000 feet, and, until late in June, are covered with snow. Hardly have the roads become passable through its melting, than the enervating heat of July and August sets in. There is, indeed, but one road available for an invading force of considerable strength. It is the road which starts from the Russian frontier fortress of Alexandrapol, on the Arpachai, and passes by way of Kars and the Soghanly Dagh to Erzerum. Alexandrapol already lies at an elevation of 5079 feet above the sea. A march of 44 miles thence brings an invader to the strong fortress of Kars, not quite 1000 feet higher. Having taken Kars, or blockaded it, the invading force would proceed to scale one of the passes leading over the Soghanly Dagh, which rises to a height of 9369 feet, and remains usually covered with snow until the middle of June. There are three of these passes. That of Eshek Meidan, in the north, leads to Bardus, at present occupied by a division of the Turkish army. The Kumtu Pass, in the centre, is the easiest of the three. It leads to Yenikoi and Ardost, likewise held by the Turks. The southernmost pass, that of Melliduz, can hardly be looked upon as available for military occupations. Having reached Ardost (79 miles from Kars), the invading force enters the fertile vale of Pasin. Following the Kala Su, one of the head streams of the Araxes, the not very formidable Eve-boyun Pass has to be crossed, and the Plain of Erzerum (6398 feet) then lies spread out before him. The entire distance from Kars to Erzerum amounts to 129 miles. The most formidable natural obstacle along this road is the Soghanly Dagh, but there are artificial obstacles which are perhaps even more difficult to overcome. The chief of these is Kars.

Kars is a very different place now from what it was when so gallantly defended during the last war. The Russians, when they evacuated the town, blew up most of the forts and even portions of the principal *enceinte*, their proceedings, which were contrary to the capitulation, entailing much loss of life amongst the inhabitants who were not informed of what was going to be done. Kars was allowed to remain a ruin for more than twenty years, until the late Husein Avni Pasha ordered it to be reconstructed, and to be armed with guns of the heaviest calibre. The work was carried on under the supervision of Colonels Strecker, Blum, and Grünwald, German officers in the Turkish service. The fortress now forms an irregular polygon, with a double masonry *enceinte* and four bastions, wet ditches, and a capital glacis. There are numerous detached works. Fort Arkanieh is the principal of these. It is a regular pentagon on Vauban's system, and occupies the summit of the Ak Dagh, which rises to a height of 260 feet to the north-west of the town. It contains the principal stores of ammunition, and is armed with eighteen 8-inch guns, twelve 6-inch guns, and sixty-eight smooth-bore 12, 18, and 24 pounders. Kara Dagh and Top Dagh, which form a semi-circle around the town towards the east and south, and attain a height of nearly 500 feet, are defended by Ingliz Tabia and Majar Tabia, that is the English and Russian batteries. These positions have been further strengthened by a series of advanced redoubts, joined to each other by covered walks, and armed with forty-eight Krupp guns, fifty-seven smooth-bores, and eleven field batteries. The town itself forms the nucleus of these fortifications. It is defended by two heavy batteries on the wooded island in the Kars-chai, and by the Kupru-Tabia, or Tête de Pont. There are now in Kars 239 defensible casemates, 314 barrack casemates, and 275 store-casemates, and the works are armed with 289 heavy and 66 field guns. Even according to our European notions the town is now a first-rate fortress.

---

[*] See diagram facing page 330.

Erzerum, too, has been converted into a modern fortress, and its bastioned walls are said to be defended by 200 Krupp guns. Many guns, however, which were intended for the armament of that place still lie along the road from Trebizond, the available means of transport, joined to execrable roads, having proved insufficient.

By the side of the main road now described, all others are of secondary importance. The valley of the Choruk Su, the entrance to which is defended by the fortress of Batum, is narrow and difficult of access. The road from Akhaltzikhe to Ardahan has been successfully taken by a division of the Russian army, and Ardahan, in spite of its newly-erected fortifications so highly spoken of by Radde, in 1874, has capitulated; but a large body of troops, with artillery, will hardly succeed in reaching Erzerum by that route. A third road, on the south, which connects Tebriz, in Persia, with Erzerum, has likewise been seized by the Russians, who now hold Bayazid. Where this road passes from the basin of the Murad into that of the Aras, it crosses the Kosa Dagh (11,276 feet), and is said not to be passable even for two-wheeled carts.

COREA.

Japan having concluded a treaty of amity and commerce with Corea, there are prospects of that last of exclusive nations in the far East opening up external intercourse with other countries, China having possessed the privilege from the foundation of the kingdom in the middle of the tenth century, before which period it was a province of the empire. Not only have friendly relations been established between the Japanese and Corean Governments, but, from latest accounts, we learn that some enterprising merchants have a steamer plying monthly from Yokohama to Fusankai, carrying on a small reciprocal traffic in exports and imports, which, in time, will show what capabilities Corea may have in developing her commercial resources with the outer world. Under these circumstances, some account of the geography of that peninsula, its natural products, the condition of its people, and the character of their rulers may not be uninteresting. At the same time, the data on which our information is given, being gleaned chiefly from foreign authorities, is necessarily fragmentary, on account of the rigid exclusiveness which debarred Europeans, at the peril of their lives, from entering into the interior.

Corea, or, as it is sometimes written, Korea, has been so named by geographers from the Japanese term Kuraee, which is derived from the Chinese name Kaou-le, given by them to the peninsula, when it was divided into three petty states. Before that division took place it was designated in the flowery Chinese language Chaou-sien, signifying "Freshness of the morning," in allusion to its insular and eastern aspect to the Sea of Japan, where the vegetation on the hills and valleys is refreshed by the morning sun and moist sea-breeze. According to Du Halde, in 1122 B.C., the Emperor of China, Vü Vang, founder of the Chew dynasty, created Ki Tsü "King of Korea," who consolidated the three dependent provinces, resuming the ancient title of the kingdom, which is the one used by Coreans at the present day, but by them pronounced Tsio-sien, and by the Japanese Tsyu-zen.

This region forms one of the great peninsulas which diversify the maritime outlines of Asia and Europe, as forming one vast geographically united continent. On referring to a map of the northern hemisphere, it is not a little remarkable that we find the Peninsula of Corea in the East almost a counterpart of the Italian Peninsula in the West. It juts out from the mainland into comparatively placid waters between the Sea of Japan and the Yellow Sea, like its European prototype, which divides the Adriatic from the Tyrrhenian Sea. The eastern and western coasts of both peninsulas trend generally in a south-east direction, and, excluding the numerous islands off their shores, they are approximately of the same area, in round numbers equal to eighty thousand square miles. Moreover, their climates are similar, so that, as far as its physical aspect is concerned, Corea may be appropriately termed the *Italy of the East*, as Japan has been called "the Britain of the East."

Beyond the coast lines and harbours surveyed by foreign hydrographers very little is known of its geographical features inland; while the positions of the mountain chains, rivers, and cities laid down on our maps are chiefly derived from Chinese and Japanese sources. Yet the interior is nowhere very distant from the numerous bays, inlets, and estuaries that indent the shores of the peninsula; but the inveterate hostility of the Coreans to all intercourse with European or American representatives endeavouring to penetrate inland, renders its topography on our map almost a *terra incognita*. Besides the peninsula there are considerable groups of islands lying off the western and southern shores, collectively named the "Korean Archipelago" on our Admiralty charts, where there is abundance of good anchorage for ships of large tonnage. The peninsula and islands comprised within the boundaries of the kingdom lie between the parallels of 33° 10′ and 42° 30′, North latitude, and the meridians of 124° 20′ and 130° East longitude. The superficies of the mainland is computed at 79,414 square geographical miles; its extreme length from north to south is upwards of 600 miles, and its greatest breadth about 300 miles.

As already observed, its topographical features resemble those of the Italian peninsula; and, although no active volcanoes are known to exist on the mainland or islands, yet geological indications of recent volcanic origin have been observed by scientific travellers visiting their shores. The highest mountain peak visible from the east coast has been measured by our hydrographers and ascertained to be 8114 feet above the level of the sea, which they named on the Admiralty chart "Mount Hien Füng," after a deceased Emperor of China, who was alive during the survey; besides another called "Taou Kwang," after his father, which was found to reach an elevation of 6310 feet. Those two peaks form links in a continuous mountain chain, which intersect the peninsula from north to south. This main range is not central, but trends along the east coast within an average of one-fourth the width of the peninsula, consequently the ridges or spurs trending in an easterly direction are precipitous, while those to the westward stretch through a comparatively level region.

Like Italy, Corea is bounded on the north by an Alpine chain, extending into Tartary, but of lesser elevation, the highest peaks ranging from 10,000 to 12,000 feet. Nevertheless, many of them rise above the snow line, in higher latitudes. Among the most noticeable is one named Pe-teu Shan, signifying "White-headed Mountain," its summit being covered with perpetual snow, which the Coreans assert is rarely visible, from being so frequently shrouded by clouds. According to Japanese accounts, it is reckoned to be from base to summit twenty *ri*, which is equal to fifty English statute miles. The valleys, of course, vary in length and width, according to the contour of the mountain ranges. Those on the eastern flank of the main range are short, narrow, and steep, like Highland glens, while to the westward they are long and wide, with undulating lands like English downs. Of the soil generally it is said to be fertile, but the Coreans themselves represent their country as being poor and limited for agricultural purposes. Of the indigenous vegetation, arborescent and herbaceous, all accounts agree in stating that it is luxuriant, the mountains, for the greater part, being covered with dense forests, comprising many species of trees, valuable for their timber.

The great dividing range naturally forms the watershed of the peninsula, especially where it begins to trend in a southerly direction, from the narrowed insular neck at its base. From this line southwards there are no rivers of much greater length than what flow through the valleys in our own island, those flowing eastward being similar to the mountain streams in the Scottish Highlands; and the others, disemboguing on the western and southern seaboards, are mostly navigable rivers like the Thames and Mersey. The most important of these streams is the Salayee, according to the Corean tongue, and the Han Kiang in Chinese, which almost intersects the peninsula from east to west, in its middle region, flowing past the capital of Sayool, or Séoul—the King-Ki-tau of our maps—and falls into the Yellow Sea. At a rough estimate, its course is about 150 miles. Next in importance is the Tsin Kiang—a Chinese name—which falls into the Great Canal of Corea, at Fusankai, the treaty port open to the Japanese. Besides these and others important to purely native traffic, there are three rivers of greater magnitude, bordering on the continent, and used for international navigation. Those that have been visited by Europeans are the largest of all, and partly form the boundaries between Corea, China, and Manchooria, now ceded to Russia. These are the Tu-mên Ula, and Ya-lu Ula, names derived from the Manchoo language, *ula* signifying "river." They both derive their sources from the same mountain, one of the highest in that region, named Chang-pe Shan by the Chinese, and Shan A-lin by the Tartars, or the "Ever-white Mountain." The one flows west, and the other east. They are both deep, somewhat rapid in their currents, and exceedingly sweet water. On the Japanese maps of that region the Ya-lu River is put down at 100 *ri*—equivalent to 242 English miles—for its direct course. Less is known of the Tu-mên River, but the Coreans say that it has many tributaries, forming a stream of great volume, with three mouths at its outlet into the sea. One great disadvantage pertains to the traffic by water to both these rivers, from the navigation being stopped by ice during several months in the year.

At an approximate calculation the seaboard of this insular territory, on all sides—east, south, and west—extends, probably, 1500 miles, not including the shores of the archipelago. Along this coast line the bays, estuaries, and inlets, forming good harbours and roadsteads, are as numerous as they are in Great Britain. On the west coast the navigation is dangerous where the currents of the tides are at times impetuous, and the navigation among the rocky islets, subject to a great rise and fall of tide, when a British man-of-war once anchored in deep water, and in the course of a few hours was floating in a shallow pool. On the eastern coast generally there is deep water, at all times of tide, and in some bays vessels can ride close to the cliffs rising sheer from the sea at a great depth. The dangerous navigation of the west coast, arising from strong tides and currents, has been hitherto the great safeguard of the capital from foreign invasion. At the same time, if the hydrography of the seaboard was better known, it may be found that the dangers of the Corean waters are no greater than those of the British, such as the tidal currents in Shetland, Orkney, and the Channel Islands.

The kingdom of Corea is topographically divided for governmental purposes into eight divisions, named *tau*, or *to*, each comprising well-defined provinces, circuits, and roads, the names of which we obtain from Chinese and Japanese sources, and given in three dialects, viz., Chinese, Corean-Chinese, and Sinico-Japanese. As the Corean-Chinese characters are those used in the native gazetteers, we shall give their rendering in Roman letters. These are—1. Kieng-kui *to*, which may be designated the Royal Circuit or province, as it embraces the capital; 2. Kang-on *to* is an eastern circuit, with a coast line of about 200 miles; 3. Hwang-hai *to* is a maritime circuit on the west, as its name denotes, on the Yellow Sea, with a line following the sinuosities of the coast, some 250 miles in extent; 4. Tsiu-dsieng *to* is on the extension of this coast line to the southward for a distance of 180 miles in a direct course. 5. Dsien-la *to* extends along nearly the whole southern seaboard of the peninsula for a distance of about 200 miles, and faces the Japanese islands of Tsu-sima, with the western channel of Corea Strait between; 6. Kieng-sieng *to* embraces the south-east angle of the peninsula, and then its eastern shore trends in a northerly direction until it reaches the southern boundary of Kang-on, having a frontage to the Sea of Japan, approximating to 210 miles; 7. Pieng-an *to* is the north-west division, which has no seaboard beyond the shores at the estuary of the Ya-lu River. It forms the boundary on the frontier between Corea and the Chinese province of Shing-king, extending for 250 miles from south-west to north-east; and, lastly, Kam-kieng *to*, forming the 8th division, having a seaboard on the east coast of about 180 miles, and its northern boundary forming the frontier between Corea and that part of Manchooria which the Russian diplomatist, General Ignatieff, dexterously acquired for the Czar's dominions by cession from the Emperor of China during the war with the British and French allies in 1861. According to the Japanese Encyclopædia, these eight *tau* or *to* are divided into 41 *kŭn*, or counties, which include 33 *pŭ*, or district cities of the first rank; fifty-eight of the second rank, called *dsiŭ*; and 70 of the third rank, named *hien*, the same designation as in China.

Considering that the peninsula and islands have a latitudinal range of nine degrees, it may be inferred that the climate of Corea is more variable than countries of greater extent situated within the temperate zone. Moreover, these variations, under ordinary circumstances, are augmented by the insular position of the country to the south, and its proximity to the Tartarian Alps in the north, especially when it is considered that the hot, moist, south-west monsoon blows one half the year, while bitter blasts set in with the north-east monsoon, during winter and spring. In the depth of these seasons the River Tu-mên and Ya-lu are frozen over with ice so thick that horses, vehicles, and heavy baggage or merchandise cross them in perfect safety, while snow falls heavily and remains on the uplands for two or three months. In the southern provinces, however, the weather is genial, and not so oppressive in summer as on the mainland of China in the same latitudes.

According to Japanese accounts, and the meagre information given by the Coreans, it is not a fruitful land. They cultivate rice in the marsh lands and in the valleys, but it is much inferior to the qualities grown in Japan or China. In the northern districts the farmers reap but scanty crops, and the poverty-stricken appearance of their homesteads show that they are a needy class of the population. Wheat, buck-wheat, barley, and millet are among the cereals, and radishes, cabbage, beans, peas, cucumbers, and melons form a large portion of vegetable diet. Plants yielding export produce comprise the wax-plant, paper-plant, tobacco, hemp, and an excellent species of cotton-plant. But the principal and most valuable export is the root of the Ginseng-plant—*Panex quinquifolium*—which is prized so highly by the wealthy Chinese, under the impression that it prolongs natural life, that it fetches its weight in gold.

Among domestic animals there is a horse of the most diminutive stature, and oxen of gigantic breed. The former is not so large as an ordinary donkey, yet it is perfect in its equine proportions and spirited in action. The latter are shod and harnessed for agricultural purposes. Sheep are almost unknown, there being, it is said, a prohibition against rearing them. Of wild animals there is a good variety, especially in the forests of the hill country, both gentle and ferocious, that furnish sport and profit to the Corean hunters. The royal tiger and panther are so numerous that their skins form an article of commerce with foreigners, through Chinese traders. These animals are distinguished from those of the same species found in the tropics by the greater length of the hair, the Bengal tiger being far inferior in beauty of fur to that of Corea. Stags, hares, foxes, sables, and wolves are abundant. The skins of sables form a prominent article of tribute to the Emperor of China, and constitute a portion of the barter which goes on at frontier markets. The musk deer furnishes a medicine and perfume that are much prized, and form articles of trade. The birds are domestic fowls, pigeons, geese, ducks, cormorants, pheasants, falcons, herons, cranes, and storks. Venomous and non-venomous snakes are said to be common throughout the country, and alligators, thirty feet long, have been found in the rivers. Fish is abundant in the sea and fresh waters, and forms a staple article of food. Whales and seals frequent the coasts in the winter season, and are caught plentifully by the fishermen, who form a large section of the industrial population.

In a region like Corea, where almost every geological formation is represented in its amorphous and stratified rocks, metalliferous minerals of every description have been found, and other simple minerals of value in manufactures and commerce. Gold has been worked in Corea from time immemorial, and became so plentiful for want of export that it is said one of the kings who died was buried in a sarcophagus of the precious metal. Be that as it may, gold as a medium of exchange bears proportionately a much less value compared with silver, as formerly was the case in Japan. Nevertheless, silver ores are abundant, especially argentiferous galena, which is reported to be mined in one hill like a quarry. Copper and tin are not so plentiful as lead and iron. However, all these metals enter largely into Corean manufactures, both useful and ornamental, and form the staple articles of trade with the Chinese. Corean swords and daggers are much sought after by them; and the matchlocks, with breech-loading cannon, taken after engagements against French and American expeditions, prove that they are a skilful and ingenious people. Coal is evidently abundant, and the mines are worked with engineering skill, while it is used in smelting ores and for household purposes in the principal cities throughout the kingdom. Altogether there are data to infer that if Corea is poor in its agricultural products it is rich in its mineral resources.

From the geographical position of the peninsula, being contiguous to China on the west frontier, Tartary to the north, and Japan on its south-eastern shores, the Coreans naturally assimilate in their ethnological characteristics with the Mongolian features of their neighbours. Their typical physiognomies present high cheek-bones, black eyes, the eyelids having an upward angle outwards, like those of the pure Chinese, yet with numerous exceptions; also, snub noses with small bridges; but the complexion is generally darker, and more like that of the Japanese. It is stated by European travellers that they are smaller in stature than either of these races, seldom 'attaining more than 5 feet 6 inches in height among the males. This, however, does not apply to the natives of the interior, and only to those seen by hostile visitors, prejudiced against the race. It would appear from other sources of information that the Coreans are a more mixed race of the Mongolian type than the Tartars, Chinese, or Japanese; and probably are descendants of people belonging to these three races who migrated to the peninsula in ancient times, dispossessing the aboriginal inhabitants of their territory, as the Japanese have done with the Aino race who once occupied their isles, only a remnant of them now existing in the Island of Yesso. This is confirmed by the ancient annals of China, as recorded by Du Halde, wherein it is stated that the country was formerly inhabited by various tribes, each having its own barbarous mode of government, and often hostile to its neighbours. Of these the most numerous and powerful were named "Han"—derived from the Chinese phrase for themselves as the "Sons of Han." This clan was divided into the Ma Han, the Pyen Han, and the Chin Han. The first-named occupied the territory of the Hwang-hai circuit, or Yellow Sea province; the second were located at Pieng An, the Pacific province; and the third on the lands of the Dsien La, or Southern provinee. A branch of the Ma Han also occupied the south-western division, named Tsin Dsieng, which means "Faithful and Pure;" and a portion of the Chin Han tribe had their abode in the south-eastern division of Kieng Sieng. Next in importance was the clan named "Mee," who held the central territories called King Kui, or the "Province of the Court," and Kang On, or "The Source of the River." Lastly, the north-eastern circuit of Kam Kieng, signifying "The Happy," was the ancient dominion of the Kan Kya Lee tribe, who were descended from the Foo Yoo, a people of Eastern Tartary.

Of the population in those ancient times, or even at the present day, the information extant is very meagre, and not much to be relied on. Père Regis, in Du Halde, informs us that about the middle of the seventh century of the Christian era, when the various tribes or clans were amalgamated under one sovereign authority, and divided on Chinese maps into five governmental circuits, these contained a total of 690,000 families. If we allow five persons to each family, this would give a population of 3,450,000; which, in all probability, was pretty near the mark, as the Chinese have, from time immemorial, computed the census of their provinces on a topographical basis. Since that period, according to the lowest statistical calculation, the population must have trebled, if not quadrupled, its numbers. On this head foreign geographers are very wide apart in their estimates, which vary from six to sixteen millions, but without furnishing any data on native authority for their statements. In the absence of such, if we take the area of the kingdom as approximate to the island of Great Britain, or the Italian Peninsula, each with a population of more than twenty millions, we might infer that the Corean Peninsula is as densely inhabited, if the fertile lands for the sustenance of the people were as great. But it has been shown that the interior is generally of a mountainous character, with poor soil on the limited lands for cultivation; therefore, if we allow only half the average number of inhabitants to the square mile, the population of Corea at present ranges probably between ten and twelve millions.

Limited space prevents us from entering into the history of the government and institutions since Corea became a monarchy. Suffice it to say that these are based upon the Chinese system of administration, by boards, over which a high functionary, or Minister of the King, presides. These are divided into six departments, which form the centre of all civil and military appointments; so that they promulgate, in the name of his Majesty, every political, social, and religious ordinance. The authority of the King is held to be inviolable and sacred, from the union in his own person of the secular and hierarchical sovereignty. Nevertheless, though his investiture by the Emperor of China is more nominal than real, he is bound to send substantial tribute annually to the Court of Peking. The Embassy appointed for this purpose proceeds to the Chinese capital by land, in the depth of winter, when the Yu-la River is frozen over with thick ice, across which the caravan marches, comprising two hundred tribute-bearers, with horses and vehicles, carrying numerous valuable packages of ginseng, cloths, furs, and other articles of native produce and manufacture. Those who have seen the arrival of the Embassy at Peking describe the dress and coiffure of the tribute-bearers as differing entirely from the modern fashions in China, but similar to what prevailed during the pure Chinese dynasties before the Manchoo-Tartar conquest, when these were altered. They have their hair tied up into a conical knot on the top of the head, no part of which is shaved, or has the long queue worn as a badge of subjection like the Chinese. To cover this great tuft of hair they wear a high-crowned hat, made of bamboo strips and dyed black. Their dress is a long coat, reaching to the ankles, made of silk or cotton, thickly wadded to keep out the cold. A sash round the waist holds it together, and instead of being buttoned, like those of the Chinese, their coats and vests are tied with short strings. They are extremely polite, and on entering an apartment take off their shoes.

Since the period when the kingdom was established under the auspices of a Chinese Emperor, the Corean Kings have received investiture at his hands on ascending the throne. At first this ceremony implied the dependent position of a tributary state, but in the course of time that has been gradually modified until now it has become almost an obsolete formality. Circumstances transpired recently at Peking when the Prince of Kung, President of the Tsung-li Yamen, or Foreign Office, stated to the French Ambassador that the Chinese Government disclaimed all political control over that of Corea. From this it may be inferred that it is, to all intents and purposes, an independent state, ruled by an absolute monarchy. Of course it has been subject to changes throughout its history, and the last and most important occurred at the close of 1873, when by a dexterous *coup d'état*, an obnoxious Regent was overthrown, while the whole of his colleagues, civil and military, were swept from office. Strange to say, however, the King who ascended the throne afterwards, and still the reigning sovereign, is his own son, who became heir apparent by adoption of the Queen Dowager. Notwithstanding this curious example of Oriental laws of succession, he is *de jure* and *de facto* the legitimate King of Corea. Although not more than twenty-five years of age, he has shown himself an astute, progressive, liberal-minded sovereign, able to rule his kingdom well, with the assistance of an entirely reformed administration appointed on his accession. These comprise three Grand Counsellors, the first in rank being styled the "Admirable Counsellor," or Prime Minister; the second is called the Left, and the third the Right Counsellor. Then come six great functionaries, *ex officio* members of the Privy Council, each being at the head of an Executive Department, as already observed, based upon the system of the great Boards of Civil Office, Revenue and Territory, Rites, War, Punishments, and Public Works, as in China, the presidents being denominated *Hpanso*.

This brings us to the conclusion of our brief sketch concerning an interesting country and people, by adding a few observations regarding the Corean language. Recent investigations by M. Leon de Rosny—a French Oriental linguist—into its philology, go to prove that, unlike the Chinese language it is based upon a real alphabet, that is to say, a series of distinct vowels and consonants. It comprises thirteen of the former and fourteen of the latter. To these twenty-seven letters five others are added, which are used for the transcription of foreign names. The words or syllables formed by these letters are written and read sometimes downwards and sometimes from left to right, according to their form and the necessity of the case. The hair pencil is used in writing, as it is among the Chinese and Japanese. A great number of Chinese characters have been retained, to which the primitive significations are kept, but the pronunciation differs from any of the dialects in China. The Corean vocabulary, when compared with that of Japan, presents only a few points of resemblance, from which the question of the lineage of the two tongues can be inferred. There exists, however, a striking resemblance between certain grammatical forms of Japanese and Corean phrases and sentences, and these, though few, do not the less claim the attention of philologists, for they bear upon an important part of lexicography. The Coreans study euphony to excess, and omit or insert a letter to effect it. We may call the Corean a very expressive language; it is neither too hard nor too soft. The Chinese language is sometimes unintelligible to foreigners, because it contains a great many sounds which are only half pronounced, while the Corean is full and sonorous, and may be easily understood. As they are a very grave people, they pronounce their words with peculiar emphasis. Their language is expressive, not on account of the great number of ideas which they can convey through the medium of conversation—for, as a rule, the Coreans have rather dull imaginations—but because of its sonorous enunciation.

Samuel Mossman.

THE INDIA-RUBBER TREES IN BRAZIL.

[In 1876 Mr. Robert Cross was employed by the Secretary of State for India to collect plants of the india-rubber Trees of Brazil, with a view to the introduction of their cultivation into India. We have already given some account of this important enterprise, and of the successful expedition of Mr. Cross to collect the caoutchouc-yielding Castilloa trees on the Isthmus of Panama (see our numbers for Feb. 1876, p. 31, and Sept., p. 253). In the following Report Mr. Cross gives most interesting details respecting the india-rubber trees of Brazil, and the methods of treating them, and of collecting the rubber.]

On the 19th of June, 1876, I left Liverpool by the "Red Cross" steamer 'Cearense,' which, after calling at Havre and Lisbon, sailed direct for Pará, which was reached on the 15th of July. This city is situated on the southern bank of the River Amazon, which, at the point where it debouches to the sea, has a breadth of 33 miles. Pará is distant 80 miles from the ocean. The population, numbering about 40,000, are chiefly engaged with the despatch of import and export produce. Everything is very dear, and, notwithstanding the reputed fertility of the Amazon Valley, I found that nearly all the necessaries of life are imported. Thus, butter and fish come from Norway; rice and flour from the United States; while sugar, coffee, and *mandiocca* are brought from the southern ports of Brazil. Import duties are high, and so also are those on produce exported, amounting, in some things, such as rubber, to 25 per cent. of the value of the article. The houses are mostly built of mud, and roofed over with tiles. The windows are chiefly formed of wood, hinged at the top, and push out from below, whence the inmates, unseen, obtain views of the street and passers by. Throughout the course of the day many of the occupants are invariably congregated behind these window lids. The great bulk of the citizens go about more ostentatiously dressed than the people of London, the attire considered essential being fine black coat and hat, with snow-white ironed vest and trousers, and fancy French boots. Those who do not conform to this style of dress are stared at. Even at the beginning I did not agree with the fashion, and afterwards was farther removed from it, by being almost daily bedaubed over with the mud of the *gapós*. Coloured females and slaves may be seen stepping into carriages, perfectly loaded with large necklaces and glittering ornaments, and even the families of foreign residents are frequently dressed in the most excessive and extraordinary manner. The phase of slavery that exists is in so mild a form that it is at first not observed. In very many instances the slaves are allowed to hire themselves out, on condition of paying their owners a certain sum of their daily earnings. The whole system is evidently dying out more rapidly than the government laws enacted for its abolition require it to do.

Merchandise and other effects are removed from one place to another in the old primitive way, thus employing many hands, who earn high wages. Emigrant Portuguese, of whom there are about 5000, are mostly the carriers, boatmen, and shopkeepers of the place. The supply of water for the city is carted through the streets in barrels, and sold at the rate of three halfpence per *poto*. The *poto* contains twenty-one English imperial pints. Within twelve hours after being deposited the water is found to precipitate a greenish substance, amounting to nearly one-fourth the quantity, which is not removed even if filtered through several folds of stout cloth. In the court-yards of the majority of the houses are open cesspools, which, in such a glowing atmosphere, may assist in developing much sickness. Dysentery, yellow fever, and various other forms of a typhoid character appear to be permanent, although of late there have been no serious outbreaks, and the place is reported more healthy than formerly. Tetanus and other forms of nervous affections are of frequent occurrence, especially among the native-born population. I have no doubt that Pará is far more unhealthy than any city in India. It may not be so naturally, but, by a combination of circumstances, such I believe to be the case.

I found on arrival, after considerable enquiry, that the great field for caoutchouc collecting was the Province of Pará, and the islands which are scattered over the lower portion of the Amazon River. Chief of these is the Island of Marajó, which is about the size of Holland. A good deal of the rubber from the Rio Negro, Madeira, and other tributaries, appears to come in the form of "negrohead," or *sernamby*, while the Pará region seems to produce to a greater extent the finer kinds of smoked biscuit rubber. The preparation is attended to more carefully; besides which, the Pará tree is reported to be a different variety. Its milk leaves no very prominent stain on the hands or clothing, while the milk of some of the varieties of rubber of the Upper Amazon gives a black ink-like mark to the hands and clothes of collectors. Black rubber is stated by some to be deficient in recoil or elasticity. In order to form and establish a collection of plants, and for the purpose of making the various observations on the soil, climate, and mode of collecting and preparing the rubber, it was necessary to obtain a place to live in while so employed. Every one told me I should experience great difficulty in finding a dwelling, and this proved true. After travelling round Pará, and searching for about eight days, I succeeded in hiring a house, but at a very high rate, as the place was large and adapted for a family with attendants and slaves. However, it was secure, and offered every facility for my various requirements, which was important. My next work was to examine the district where the rubber trees grew. Mr. Henderson, who was known to Dr. Spruce, kindly introduced me to an old rubber collector, called Dom Henrique, who undertook to lead the way to the *seringal*, as the rubber locality is termed; but, after disappointing me twice, I resolved to lose no more time, and procuring from him the services of a lad as guide, I began to inspect the forest. On the 25th of July I made a preliminary journey to the region where the trees were wrought.

The land around Pará, including where the city stands, rises from the bank of the river southward, in the form of gentle undulations, indented, however, in many places by deep gulley-like natural ditches, called *gapós*, which often penetrate for many miles into the interior of this vast forest region, and are filled daily by the tide. To those navigable by canoes or sailing craft, the term *ujarape* is often applied. The intervening land between the *gapós* is frequently flat and moist, and owes its origin first to tidal deposits, and afterwards is raised higher by the decayed remains of successional rank growths of vegetation. On the elevated lands, beds of white sand, twenty feet in depth, are met with, covered with a layer of decayed vegetation. At a similar level to this we find a deposit approaching to clay, or very fine sand and mud, with here and there masses of sandstone or granite cropping out. In every direction where a view can be obtained, the country is seen to be covered by dense exuberant forest. Leaving Pará, I travelled over the high ground for several miles, until the primitive forest was reached, and then went down towards the *gapós*. Following through the wood a path used by the caoutchouc collectors, we soon came to a large tree in a state of decay, which had been tapped many times. At first sight I felt extremely puzzled and perplexed with the appearance it presented. From the ground up to a height of 10 or 12 feet, the trunk was one swollen mass of warty protuberances and knots, covered with thick scales and flakes of hard dry bark.

This singular state of growth, the result of the system of tapping, has not yet been recorded by any one, and so was to me unexpected. A few minutes of careful examination soon showed the real cause of these deformities. The collector makes use of a small axe-like implement, an inch broad. At each stroke he cuts through the bark and into the wood for fully an inch. Hundreds of these are made in the wood of each tree in the course of a few years, and cannot heal under any circumstance; but a layer of word is formed over the injured part, at the expense of the bark and general vitality of the tree. The newly formed wood is again cut into and splintered, and so the process is repeated on each successive layer until the trunk becomes merely a mass of twisted, wrinkled wood, with very thin, insipid bark. In this condition hardly any milk flows from the cuts, and although for years a few green leaves may continue to sprout from the points of the twigs, yet the tree may be considered as dead, and, in fact, finally withers away. It is, therefore, the injury done to the wood, and not overtapping, which lessens the flow of milk, and ultimately causes the death of the tree. The cuts in the wood are, of course, unnecessary, since the milk is met with only in the bark. The healing-over process which afterwards takes place is similar to that seen where a branch has been lopped from a trunk. The wood is compact and rather hard, and for this reason the tree lives on for a number of years, although cut and hacked every season; but the flow of milk becomes so lessened that many are practically abandoned for years before they die. This, and several large adjoining trees, were growing in moist, deep, heavy soil, of a fertile character, but quite out of the reach of any inundation.

On the 2nd of August I went in search of plants, and descended to the region of the *gapós*. It had rained a good deal previously, and the collector's footpaths were ankle-deep with mud. After wading several little pools we came to a deep *gapó*, into which the tide flowed. It was connected with many lesser watercourses, that formed a kind of network extending over a wide district of forest-covered country, the more elevated parts of which were raised only from three to four feet above the highest tides.

A considerable number of rubber trees grew along the margins of both the larger and smaller streams, intermixed with cacao and forest trees. Three were observed, the base of the trunks of which were flooded to a height of one foot, yet the roots seemed to run up to the brow of the bank, and no matted rootlets were observed, as is the case with the willow tree when growing on the margin of a rivulet. Most of the others occupied dry situations. Those *gapó* ditches were lined with soft, rich mud, without doubt possessing great fertility. The exhalations from such places, shrouded by a forest growth of 80 or 100 feet high, were sensibly felt, and on nearly every occasion when I visited those localities I experienced slight attacks of fever afterwards. The collectors also, during the working season, are often indisposed from the same cause. Although the forest was excessively damp, yet tapping was being carried on, as a man was seen mixing up some clay at the side of a *gapó*. A number of good plants were met with beneath the oldest trees. The seedlings did not usually grow in any place where the ground was covered by more than two or three inches of water at flood tide. However, by far the greatest number were met with on sites above the reach of the highest tides. I measured a few of the largest trees, all of which had been tapped for periods varying from five to fifteen years. Those found growing in shallow *gapó* ditches are preceded by an asterisk. The circumference of each one yard from the ground was as follows:—

	Feet.	Inches.		Feet.	Inches.
No. 1.........	6	9	No. 7.........	4	0
No. 2.........	6	10	No. 8.........	5	10
No. 3.........	4	7	No. 9.........	4	0
No. 4.........	3	0	No. 10.........	4	6
No. *5.........	5	10	No. 11.........	4	8
No. 6.........	5	3	No. *12.........	2	8

Most trees occurring within the limits of the worked districts are tapped, if possessing a diameter of 6 or 8 inches. Regularly tapped trees, as a rule, do not exceed 60 feet in height.

August 7th, I went in search of more plants, and on the 10th made another collection. About two thousand, in all, were obtained, but a number had to be rejected. I had cases previously made, so that I was able to plant the plants in them without delay. The soil consisted of decayed leaves brought from the forest. The rougher portion was charred and put in the bottoms of the cases, to serve as a sort of drainage. Then a layer, mixed with some wood ashes, was placed above, and the plants planted therein. Four cases, containing upwards of 1000 plants, were finished in this way, one being reserved for copaiba or any other sort of rubber plants I might meet with. While the plants were being established I commenced a series of experiments, in order to ascertain how the tree might be readily multiplied in a simple, rough way by any person not specially acquainted with the principles of propagation. Two separate beds, the one of brown sand, the other of decayed leaves, was formed. The terminal portion of shoots, but with a bud at the lower end, were planted in the beds in a reclining position, with only two inches of the points above the ground. Owing to the great distance between the buds, consequent on vigorous growth, many of the cuttings were a foot or more in length. At the same time a number were set deeply in an open vessel, containing only rain water. The cuttings in the sand bed were the first to grow, and soon made strong shoots and root fibres. Those in the leaf mould pushed more slowly, but developed green leaflets of great substance. The cuttings placed in the water had a small portion of tap root at the base, as the object was to determine if the roots would actually develop in water alone. Within fourteen days these plants had several roots formed, and one or two rather weak growths came up, but a few days after I had thrown into the water some burnt earth and wood ashes the increase in vigour was very apparent. After these experiences, I felt convinced that the Pará rubber tree delights in abundance of moisture and rich, fertile deposits.

Method adopted in Tapping the Trees.—When the plants were somewhat established I resolved to examine attentively the process of tapping, as practised by the caoutchouc collectors. In the investigation of this subject I travelled over a very wide extent of flat forest country, much divided by miry hollows and tidal *gapós*, which stretched along the bank of the River Guamá. Although this river is at least three times as broad as the Thames at London-bridge, it is not to be seen on any ordinary map. In the region alluded to there were hundreds of trees wrought by different collectors, each of whom had a separate piece of land to work on. When on these excursions I had to go away from my place of abode at about three o'clock in the morning, as I had some miles to travel over paths not always in good condition, and it was necessary to be as near as possible to the spot where the tapping operation was performed, because the collectors begin to work immediately at daybreak, or as soon as they can see to move about among the trees. They say the milk flows more freely and in greater quantity at early morn. I do not attach much importance to this statement, but I have recorded it. Another and more probable reason is, that as rain often falls about two or three o'clock in the afternoon the tapping must be done early, as, in the event of a shower, the milk would be spattered about and lost. The collector, first of all, at the beginning of the dry season, goes round and lays down at the base of each tree a certain number of small cups of burnt clay. At the lesser trees only three or four are put, but at the larger ones from eight to twelve are deposited. The footpaths leading from tree to tree are likewise cleared of sapling growths, and the bridges over the *gapós* formed at each place by the trunk of a tree are, where necessary, replaced. On proceeding to his work the collector takes with him a small axe for tapping, and a wicker basket containing a good sized ball of well-wrought clay. He usually has, likewise, a bag for the waste droppings of rubber, and for what may adhere to the bottoms of the cups. These promiscuous gatherings are termed *sernamby*, and form the "negrohead" of the English market. The cups, as already stated, are of burnt clay, and are sometimes round, but more frequently flat or slightly concave on one side, so as to stick easily when, with a small portion of clay, they are pressed against the trunk of the tree. The contents of fifteen cups make one English imperial pint. Arriving at a tree, the collector takes the axe in his right hand, and, striking in an upward direction as high as he can reach, makes a deep, upward-sloping cut across the trunk, which always goes through the bark and penetrates an inch or more into the wood. The cut is an inch in breadth. Frequently a small portion of bark breaks off from the upper side, and occasionally a thin splinter of wood is also raised. Quickly stooping down he takes a cup and, pasting on a small quantity of clay on the flat side, presses it to the trunk, close beneath the cut. By this time the milk, which is of dazzling whiteness, is beginning to exude, so that, if requisite, he so smooths the clay that it may trickle directly into the cup. At a distance of four or five inches, but at the same height, another cup is luted on, and so the process is continued until a row of cups encircle the tree at a height of about six feet from the ground. Tree after tree is treated in like manner, until the tapping required for the day is finished. This work should be concluded by nine or ten o'clock in the morning, because the milk continues to exude slowly from the cuts for three hours, or perhaps longer. I may state that there is a great difference among collectors in the performance of those duties. Some take care to get good clay previously and incorporate it well, so that a very small portion is needed to lute the cups to the trunks; they also work with neatness and intelligence, and invariably collect a good quantity of milk. Others, again, do not take the trouble to prepare clay beforehand, but merely scrape up a handful when they require it at the side of a *gapó*, which is often of little consistence, so that a large quantity is required to fasten the cups. This class of collectors have often many fragments of clay or other impurities in their milk, the result of not following a proper method of working. The quantity of milk that flows from each cut varies, but if the tree is large, and has not been much tapped, the majority of the cups will be more than half full, and, occasionally, a few may be filled to the brim. But if the tree is much knarled from tapping, whether it grows in the rich sludge of the *gapó* or dry land, many of the cups will be found to contain only about a tablespoonful of milk, and sometimes hardly that. On the following morning the operation is performed in the same way, only that the cuts or gashes beneath which the cups are placed are made from 6 to 8 inches lower down the trunk than those of the previous day. Thus, each day brings the cups gradually lower, until the ground is reached. The collector then begins as high as he can reach, and descends as before, taking care, however, to make his cuts in separate places from those previously made. If the yield of milk from a tree is great, two rows of cups are put on at once, the one as high as can be reached, and the other at the surface of the ground; and, in the course of working the upper row, descending daily 6 or 8 inches, while the lower one ascends the same distance. Both rows in a few days come together. When the produce of milk diminishes in long wrought trees, two or three cups are put on various parts of the trunk where the bark is thickest. Although many of the trees of this class are large, the quantity of milk obtained is surprisingly little. This state of things is not the result of overtapping, as some have stated. Indeed, I do not believe it is possible to overtap a tree if in the operation the wood is not left bare or injured. But at every stroke the collector's axe enters the wood, and the energies of the tree are required in forming new layers to cover those numerous wounds. The best milk-yielding tree I examined had the marks of twelve rows of cups, which had already been put on this season. The rows were only 6 inches apart, and in each row there were six cups, so that the total number of wood cuts within the space of three months amounted to seventy-two. It grew close to a *gapó*, only 8 inches above high tide mark, and, being a vigorous tree, the cups were usually well filled; but with two years or so of such treatment the tree would probably be permanently injured. It has been supposed that the quality of the milk is better in the dry season than during the rains. Such is the case with some vegetable products, but as regards india-rubber there ought not, I think, to be any appreciable difference. In the rainy season the milk probably contains a greater proportion of water, but on the other hand I am of opinion that then a larger quantity of milk flows from the tree. No doubt the dry season is the most suitable for caoutchouc collecting, although wherever a plantation is formed with preparing-house convenient, tapping may certainly be always carried on when the weather is fine. It is a common report that the trees yield the greatest quantity of milk at full moon. In order to ascertain this, a number of very careful experiments would require to be made, extending over one or two years. Even if such an assertion was found to be true, it would probably make little difference, as tapping will have to be carried on when circumstances are most favourable.

There are two other methods adopted in tapping, which are chiefly confined to the Upper Amazon and tributaries. Both are exactly on the same principle, the materials used being only a little different. The loose outside bark of the tree is cleaned off to a height of about 3 feet. Beneath, a gutter, or raised border of clay, is pasted or luted to the trunk, enclosing one-half or the entire circumference. Cuts are thickly made in the bark above this, from which the milk flows down to the gutter, whence it is conveyed to fall into a calabash conveniently placed. The other mode is by winding round the trunk the stout flexible stem of a climber, and claying it round securely; so that no milk may escape between the trunk and the climber. These plans are not extensively adopted, and can only be successfully put in practice where the trees have not been previously tapped. There is always a great deal of "negrohead," the result of the distance the milk has to run, and to the large quantity of clay employed in the process.

Collection of the Milk.—Going from tree to tree at a sort of running pace, the collector empties the contents of the cups into a large calabash, which he carries in his hand. As he pours the milk out of each cup, he draws his thumb or forefinger over the bottom, to clean out some which otherwise would adhere. Indeed, a small quantity does remain, which is afterwards pulled off, and classed as *sernamby*. The cups, on being emptied, are laid in a little heap at the base of each tree, to be ready for the following morning. The trees occur at various distances, from 10 to 100 yards apart, and as I travelled over the intricate network of muddy footpaths, I continually felt perplexed and surprised that the natives have not yet seen the advantages that would be derived by forming plantations, whereby more than twice the quantity of caoutchouc might be collected in one-fourth the time, and at far less cost and labour.

Method of Preparing the Rubber.—The collectors of the region I visited resorted with their milk to a large shed, situated on the bank of the River Guamá. Here were quantities of various species of palm nuts—representing an *Attalea* and *Euterpe edulis*—stored in heaps, and several jars for the preparation of rubber. These jars were 18 inches high, and the bottoms were broken out. At the base they were 7 inches in diameter, bulging out in the middle to 12 inches, and were narrowed at the mouth to a breadth of 2 inches. Each person wrought on his own account, and so small jars were employed; but where a number of men are collecting for one master, much larger jars are in use. The milk, on being put into a large flat earthen vessel, is put down on the floor in a convenient place. Adjacent thereto the jar is set on three small stones, which raises it 1½ inch above the floor. The narrow space between the base of the jar and the floor allows the air to enter, which causes a current of smoke to ascend with remarkable regularity and force. When the fire commences to burn strongly several handfulls of nuts are put on; then some more wood and nuts, alternately. These are dropped in at the mouth of the jar until it is filled to within 4 inches of the top. Due care is taken that a sufficient proportion of wood is put in with the nuts. The mould on which the rubber is prepared resembles the paddle of a canoe; in fact, at many places on the Amazon this is the article most frequently used if there is much milk, and when the rubber is prepared in bulky masses. Occasionally the mould is slung to the roof, as the weight in handling it during the process would otherwise be very fatiguing. A little soft clay is rubbed over it, to prevent the rubber from adhering, and it is afterwards well warmed in the smoke. The operator holds the mould with one hand, while with the other he takes a small cup and pours two or three cups of milk over it. He turns it on edge for a few moments above the dish until the drops fall, then quickly places the flat side 2 inches above the jar mouth, and moves it swiftly round, as if describing the form of a cipher, with his hand, so that the current of smoke may be equally distributed. The opposite side of the mould is treated in the same way. The coating of milk on the mould, on being held over the smoke, immediately assumes a yellowish tinge, and although it appears to be firm, on being touched is yet found to be soft and juicy, like newly-curdled cheese, and sweating water profusely. When layer after layer has been repeated, and the mass is of sufficient thickness, it is laid down on a board to solidify, and in the morning is cut open along the edge on one side, and the mould taken out. Biscuit rubber when fresh is often 4 or 5 inches thick. On being hung up to dry for a few days it is sent to market. When I saw the process of smoking the rubber performed, as just described, I was considering the statements of Keller, and other travellers, who write on this subject, all of whom seem to believe that the smoke from the palm nuts possesses some peculiar or strange property, by which means the milk instantly coagulates. But on one occasion, when the collector was commencing to smoke some milk I saw him wait for a short time, during which he put his hand repeatedly to the mouth of the jar, and soon learned that he could do nothing until the smoke was hot. The dense white smoke rose abundantly, but the milk would not thicken on the mould. After a little while the jar became heated, and the operation went on quite satisfactorily. I put my hand above the mouth of the jar, but could not bear the heat scarcely a second; and although the temperature of the smoke was apparently less than boiling water, yet I judged it must have been at least 108° Fahrenheit. Therefore the rapid coagulation of the milk is simply produced by the high temperature of the smoke. I have no doubt that with a strong current of heated air, or a good pressure of steam from a pipe, a similar result would be obtained. The finely-divided particles of soot, which form a large proportion of the smoke, undoubtedly absorb a considerable amount of moisture, although at the same time they must be looked on as an impurity. I have no hesitation in giving my opinion that equally as good rubber could be prepared by putting the milk in shallow vessels, and evaporating the watery particles by the heat of boiling water.

Temperatures of the Pará Rubber District.—I now proceed to give the temperatures taken during my stay in the region of Pará. According to the natives, the rains begin in November or December, and end in June. However, during the intervening months of summer it will be seen that showers of rain are frequent. These usually occurred between two and three o'clock in the afternoon, and streamed down with a force similar to the monsoon showers in India. The days on which rain fell are preceded by an asterisk.

1876.	Morn.	Noon.	Night.
July *17	—	88°	81°
*18	79°	88	81
19	80	87	83
*20	79	86	79
*21	79	87	79
22	77	86	85
*23	79	87	83
24	79	87	85
*25	79	89	83
26	79	87	84
27	80	87	84
*28	79	88	81
*29	77	89	83
*30	81	90	84
*31	80	86	82
August 1	79	80	79
2	77	86	83
3	78	87	85
4	79	87	83
*5	79	89	83
*6	79	87	84
7	77	86	83
8	80	88	84
*9	80	88	83
10	79	89	84
*11	78	87	82
*12	80	86	80
*13	79	87	82
14	77	84	81
15	77	87	82
*16	77	85	81
17	78	88	84
18	79	88	83
*19	78	88	82
*20	78	87	81
21	79	88	83
22	77	89	82
23	78	89	82
*24	77	88	82
25	79	87	81
26	77	86	84
27	78	87	83
*28	79	85	81
*29	76	87	82
*30	77	86	81
*31	78	87	82
Sept. *1	76°	86°	83°
2	76	86	84
3	73	89	85
4	84	92	83
5	82	91	81
*6	73	90	82
7	73	91	81
8	76	89	81
9	76	88	83
10	75	90	77
*11	76	89	83
12	75	89	81
13	74	88	82
14	75	87	81
15	76	89	83
*16	75	90	81
17	74	88	84
*18	73	87	81
19	74	87	83
20	73	89	80
21	74	88	83
22	73	89	83
23	75	91	82
24	76	90	84
25	75	87	83
26	74	92	81
27	75	92	84
28	74	93	85
29	75	92	83
30	76	92	85
Oct. 1	74	91	84
2	74	92	85
*3	75	91	84
4	74	87	82
5	76	90	84
6	75	89	85
*7	74	88	84
*8	75	89	83
*9	74	88	82
10	76	87	84
11	75	89	83
12	75	88	84
*13	76	87	84
14	74	89	83
15	75	90	84
16	75	90	82
17	75	89	85

A glance at these figures will show that the region of the Pará rubber tree has a sustained high temperature, a fact which has already been remarked by Dr. Spruce, and other travellers. The lowest I recorded was 73°, but Mr. Henderson assured me he had frequently seen it down to 72°, and I have the statement of another observer, on whom I can rely, that on one occasion the thermometer fell to 65°. The place, however, where this observation was made, was fully 100 miles to the westward of Pará. In the neighbourhood rubber trees abounded.

Sites, Propagation, and Planting in India.—The sites most suitable for the planting of this tree will be found in the hottest parts of India. The flat, low-lying moist tracts, lands subject to inundation, shallow lagoons, water holes, and all descriptions of mud accumulations, miry swamps, and banks of sluggish streams and rivers, will be found best adapted. The tree will also grow perfectly in deep, humid land, fitted for cane or coffee planting. The Malay Peninsula, Burmah, the Island of Ceylon, and the southern portion of India, on to about as far north as 20° north latitude should possess many localities proper.

The temperature of rain-water varied from 74° to 75° for planting. But in no place would I recommend the formation of a plantation where the thermometer at any time falls below 60° Fahrenheit.

It seems to me that the propagation and planting may generally be combined in one operation, the object being to reduce the expense, simplify, and accelerate the work, and promote the more perfect development of the primary roots and trunk. The green-coloured terminal shoots of succulent growth, with the leaves fully matured, make the best cuttings. These should be cut off low enough so that there is a joint at the base. When it is desirable to plant in dry, firm land, a spadeful or two of soil should be turned over at each place, and the cutting planted in a sloping position. It should be covered with mould to within 3 inches of the point. That portion above ground should rest on the earth on one side, to its termination, so as not to suffer during hot sunshine. In all stages the crowns of the plants may be exposed to the rays of the sun. Plants intended for cutting stocks may be planted in open places, in the richest dark loam capable of producing a luxuriant rank crop of sugar cane. Seeds might be planted out permanently at once, also in the same way as the cuttings. These would prosper much better if, at the time of planting, a handful of wood ashes is added to the soil with each seed. Good ashes may be obtained by the burning of any description of green wood, or newly felled piece of forest. If the wood is allowed to rot before burning almost the whole of the fertilizing principle will be found to have vanished. If stored in a damp place the value of the product is diminished. For planting on inundated lands the period of high flood should be preferred. Cuttings of greater length would be required in this case, the lower ends of which should be sliced off in the form of a wedge. The workman could take a bundle of these, and wading into the water would plant, at proper distances, but perfectly upright, taking care to push each cutting down deep enough in the soft muddy bottom, so that not more than 3 or 4 inches is above the surface of the water. The same rule would be applicable when planting in sludge or soft marsh land. The crowns of the cuttings must not, if possible, be put under water, as the young growths springing therefrom might rot. Seeds will not be found very applicable for planting in watery places or deep mud deposits. Some would come up, but a good many would mould and decay. In the varied course of circumstances and conditions, slight changes and modifications in the methods of working will, no doubt, suggest themselves. I would not advocate—at least for the present—the extensive planting of this tree in fertile cane-producing lands, because in such a description of soil it would not be able to compete with the Central American rubber tree already introduced from the State of Panama, which grows rapidly to a much greater size, and yields a far larger quantity of caoutchouc. It should rather be planted in places where nothing else could be profitably cultivated, such as frequently inundated river margins, marsh land, and mud deposits. About 4000 tons of Pará rubber are exported annually.

(To be continued.)

Reviews.

——:o:——

DISCOVERIES OF PRINCE HENRY THE NAVIGATOR.*

This is a second edition of Mr. Major's valuable life of Prince Henry the Navigator, first published in 1868. Neither our magazine nor its predecessor, *Ocean Highways*, was then in existence; and as but a very small number of copies of the first edition were printed, it is probable that it did not come into the hands of many of our readers: we propose, therefore, to treat the present edition as if it was a new work.

We join in our author's surprise that no Englishman before 1868 had undertaken to write a life of Prince Henry, whose character and pursuits were such as to be especially attractive to our countrymen, and who was himself half an Englishman. Mr. Major is fortunate in finding such a field open to him; he has shown sense and discrimination in occupying it; and he has made up for the neglect of former generations by the way in which he has compiled the life of his hero. His book, the result of much labour and research, is agreeably written, and very well got up.

Notices of the Prince are to be met with in various works on history and travel. Washington Irving, in his *Life of Columbus*, justly attributes the grand impulse of discovery to the deeply meditated effort of Henry's master-mind. Yet, beyond a general knowledge that the early voyages of discovery on the coast of Africa were prompted by a Portuguese prince, we doubt there being many who are acquainted with the life of Prince Henry, a man of whom it is not too much to say that he was not only one of the greatest men of his time, but one of the greatest any age or any country ever produced.

---

* *The Discoveries of Prince Henry the Navigator, and their Results.* By Richard Henry Major, F.S.A., Keeper of the Department of Maps and Charts in the British Museum, Hon. Sec. of the Royal Geographical Society. Illustrated with Portraits, Maps, &c. London (Sampson Low, Marston, Searle, and Rivington), 1877.

Prince Henry—named, doubtless, after his ancestors, the Dukes of Lancaster—was the fourth son of John I. of Portugal. This monarch was the illegitimate son of Peter, King of Portugal, and owed his crown to the same national and patriotic feeling which at a later date placed the house of Braganza on the throne. Ferdinand, the son of Peter, left one child, Beatrix, married to John I. of Castile. The Portuguese, already dreading the Castilian rule, refused to acknowledge her as their queen, and placed John, the Grand Master of the Order of Aviz, on the throne. His reign lasted forty-eight years; he was the greatest of the Sovereigns of Portugal, and he founded the dynasty of Aviz, under which that country enjoyed power and consideration beyond any it had enjoyed before, and such as it has certainly not known since the extinction of the dynasty three hundred years ago. King John married Philippa, daughter of John of Gaunt* by Blanche, heiress of the house of Lancaster. The King and Queen brought up their children with the greatest care, and the King, watchful of the bent of his son Henry's mind, took advantage of his natural taste, and had him instructed in mathematics.

In 1415, when the Prince was aged twenty-one, his father undertook the siege of Ceuta from mingled motives of religion and ambition, and to provide a field in which his sons Edward and Henry might win their spurs. The expedition was successful; Ceuta was permanently wrested from the Moors, and Prince Henry gained such military renown that he was afterwards invited to undertake the command of their respective armies by the Pope, the Emperor, and the Kings of Castile and England, both his first cousins. His ambition, however, lay in another direction, and had a loftier aim. Forsaking the delights and intrigues of courts, and the excitement and reputation of camps, whilst still little more than a youth, he fixed himself on the inhospitable promontory of Sagres, in the province of Algarve, of which he had been appointed governor. Of Sagres our author says that "it was a small peninsula, the rocky surface of which showed no sign of vegetation, except a few stunted juniper-trees, to relieve the sadness of a waste of shifting sand. Another spot so cold, so barren, or so dreary, it were difficult to find on the warm and genial soil of sunny Portugal. Landwards the north-west winds were almost unceasing, while three quarters of the horizon were occupied by the mighty and mysterious waters of the as yet unmeasured Atlantic." Here he devoted himself to the study of navigation and cartography; he continued his early pursuit of mathematics; he collected geographical information, both ancient and Arabic; he gathered round him experienced navigators from other countries; and he organised those voyages of discovery which for a period of forty-two years he continued to send out in constant succession. He adopted as his motto "Talent de bien faire," and on this maxim he acted through life. The only occasion in his career in which he can be charged with want of wisdom, is the attack on Tangier in 1437. On this occasion his brother, King Edward, a man his inferior in force of character, though virtuous and amiable, showed more foresight and prudence. The disastrous results of this expedition, the complete defeat of the Portuguese, and the capture, and long years of slavery only ended by death of the unfortunate Ferdinand, "the constant Prince," are well known. Heavily as the sufferings of his brother weighed upon Prince Henry's mind, he had the patriotism and courage to refuse to advise his release at the price of the surrender of Ceuta to the Moors.

Seldom, and only by affairs of state, was the Prince drawn from his studies at Sagres: in one more military undertaking, however, he engaged. In 1458, in company with his nephew, Alfonso V., he laid siege to Alcaçar Seguer, and displayed humanity rare in that age, especially when the objects of it were *infidels*. After the capture of Alcaçar Seguer he returned to Sagres, and there died, Nov. 13th, 1460. The reputation he left behind him was that of a man stout of heart, keen in intellect, and extraordinarily ambitious of achieving great deeds. Free alike from luxury or avarice, he was so generous that the household of no uncrowned prince formed so large and excellent a training school. All worthies of the kingdom, and still more foreigners of renown, found a welcome in his house; none left it without a proof of his generosity. His self-discipline was unsurpassed; his days, and often nights, were spent in hard work. He was constant in adversity, humble in prosperity, obedient to his Sovereign, devoted to the public interest, a devout Christian. He was universally beloved, for he did good to all and injured none.

It is impossible to contemplate his early and life-long devotion to science without admiration; and this is increased when we reflect on his constancy and perseverance in spite of small results obtained at a great expense, and in spite of much that must have seemed little better than failure. He was not permitted to see the great results of his study, thought, and labour; but all the more does it behove us to give to him the credit which is undoubtedly his due. He found navigation in its infancy: the sailors, timid and ignorant, crept along the coast; when sent out on voyages of discovery they eagerly seized any imaginary danger or ridiculous report as a reason for returning. Close as Africa is to Portugal, the Portuguese, by the beginning of the fifteenth century, do not appear to have sailed along the west coast beyond the ominously named Cape Non. For forty-two years the Prince laboured unceasingly—sent out at his own cost expedition after expedition on voyages of discovery—endeavoured by sound reasoning to remove the absurd alarms of the sailors—encouraged their commanders by rewards—suggested the great use of latitude and longitude in sailing, showed how these were to be ascertained by astronomical observations—improved the art of shipbuilding. And what results did he live to see? The knowledge of the west coast of Africa extended to the Rio Grande, or Jeba, in about 12° N. latitude—the Cape de Verde Islands discovered—Madeira and the Azores re-discovered—this is the sum of the result of the Prince's labours in his lifetime. His life might then have been pronounced wasted: doubtless there were then shallow-minded persons who called it a failure. The judgment of posterity is otherwise:—"The coasts of

---

* The intimate connection between John of Gaunt and the Peninsula is worthy of notice. He married the illegitimate daughter of Peter the Cruel, another of whose daughters married his brother Edmund. One of John of Gaunt's daughters was Queen of Castile, and another Queen of Portugal.

Africa visited; the Cape of Good Hope rounded; the New World disclosed; the sea-way to India, the Moluccas, and China laid open; the globe circumnavigated, and Australia and New Zealand discovered; such," says Mr. Major, "were the stupendous results of a great thought and indomitable perseverance."

The Prince infused his spirit into his nephew, Alfonso V., and his great-nephews, John II. and Manuel, successively Kings of Portugal. The timid sailors gained under his teaching a knowledge of navigation that gave them courage to brave the wide expanse of the Atlantic, even in half-decked vessels. All the great discoveries made for years after were made by Portuguese, or those who had studied in Portugal. In 1486 Bartholomew Diaz, one of a family of Portuguese discoverers, first rounded the Cape. The great Vasco da Gama, the first to reach India by sea, the great object of Prince Henry's ambition, was a Portuguese. Columbus spent fourteen years in Portugal, studied much at Lisbon, and made several voyages to the coast of Guinea in the Portuguese service, and, had it not been for the perfidy of the King, Portugal, and not Spain, would have reaped the harvest of his great discovery. Magalhaens, the first to navigate the straits which bear his name, was of a noble Portuguese family, brought up in the household of Queen Leonora, wife of John II. Thus all the great discoveries made for two centuries after his time may fairly be traced to the Prince. It is certain that without him America must in time have been discovered; but how long might not that discovery have been delayed! and how different might not the history of the world have been!

We have preferred giving a general sketch of Prince Henry, and the results of his life, to following Mr. Major in his account of the various expeditions sent out by him. For these we refer our readers to Mr. Major's book, and promise them both pleasure and profit from its perusal.

AFRICAN EXPLORERS.*

AN important article on "African Explorers" has been contributed to the *North American Review* for May-June, 1877, by Mr. Laurence Oliphant. A chief object of Mr. Oliphant is to show that, as regards African discovery, the blue ribbon was carried off by the late Captain Speke, and to call attention to the work accomplished by that successful and intrepid explorer. It was certainly time that the general reader should be reminded of the exact nature and extent of Speke's discoveries; for the acceptance of Mr. Stanley's pretension to having discovered a new Nile source, which he has called the "Alexandra Nile," would indicate that Speke's work was not borne in mind, and was to some extent forgotten.

Mr. Stanley claims to have discovered a lake which he has named the "Alexandra Nyanza," and a river which he calls the "Alexandra Nile." Mr. Oliphant reminds us that both lake and river were discovered by Captain Speke. The river is the Kitangule (or Kageera). Its size and importance were fully appreciated by that officer, but, after carefully weighing the importance of the Kageera as a Nile feeder, he very properly did not call it the Nile; because, when a large river issues from a mighty lake into which flow hundreds of affluents, he judged correctly that the river which left the lake was not the same river as any one, even the largest, of those affluents.

Mr. Oliphant then observes that "if the Kageera is to be called the Nile, the discoverer of it, in that capacity, is indisputably Captain Speke, and not Mr. Stanley, who has changed its name into Alexandra Nile; though, in point of fact, it can no more properly be considered so than an affluent of Lake Superior could be called the St. Lawrence, or a stream running into Lake Itasca called the Mississippi. Mr. Stanley has not merely thought fit to change the name of the Kageera River into that of the 'Alexandra Nile,' but to assume that he has discovered the source of the Nile in a lake which Captain Speke has delineated in his map as Akenyara, and he has changed the name of this lake into 'Alexandra Nyanza.' Mr. Stanley does not seem to be aware that it is not according to polite usage for explorers to give names to lakes which they have not visited, if they figure on the maps of former travellers, and still less to change names of rivers which have been previously discovered and carefully laid down." Mr. Stanley, in his letter, says that he has not the works of Speke with him; upon which Mr. Oliphant observes that if he had not neglected to provide himself with the only description in existence of the region he proposed to explore, "he would have avoided the grievous error of supposing that he was making important geographical discoveries, or adding in any essential particular to the information which had already been obtained by Speke."

"Mr. Stanley gave us an admirable account of this region a year ago, in a letter dated April 1876" (see our number for September 1876), "where he casually mentions Akenyara as a lake 30 miles by 20, and entirely confirms Speke's account of the drainage of this range. He has never revisited the scene of his exploration since then, and why we should now be favoured" (see our number for May 1877, p. 124), "as a sort of second thought, with a map and a theory which are both so improbable, it is difficult to imagine, unless it be that each letter he sends home must be a discovery. First we have the Shimeeyu as the source of the Nile discovered by Stanley in 1875; now we have the Kageera source discovered in 1876; and it is to be supposed that as the public demand for Nile sources increases, Mr. Stanley will be called upon to supply them."

Passing to the Tanganyika, Mr. Oliphant thinks "that the map, which Mr. Stanley has sent home, of the Lukuga Creek, as the result of his personal examination (see our number for May 1877, p. 124), is as valuable as the imaginary one of Akenyara is worthless; and although we may not altogether accept his conclusions, they are ingenious, and open a wide field for conjecture." Mr. Oliphant's conclusion, which he arrives at after a very interesting discussion of the question, is that the Tanganyika Lake occasionally overflows by the Lukuga outlet, and thus, from time to time, discharges into the Congo. This great discovery of Commander Cameron was fully explained in our number of March 1876, and the conclusion we arrived at was the same as that of Mr. Oliphant.

---

* *African Explorers*, by Laurence Oliphant. In the *North American Review*, May-June, 1877, IV., p. 383. (Trübner & Co.)

GEOGRAPHICAL SCHOOL BOOKS.

History Primers. Geography. By *Geo. Grove, F.R.G.S.* (Macmillan.)

Stewart's Local Examination Series. The Book of Physical Geography. By *Keith Johnston, F.R.G.S.* (W. Stewart and Co.).

History Primers. Classical Geography. By *H. F. Tozer, M.A.* (Macmillan.)

The compilation of geographical school-books too frequently is intrusted to persons who, whatever qualifications they may possess as teachers, are hardly in a position to keep abreast of the rapid progress that is being made in every department of geographical inquiry. Teaching and learning should certainly go hand in hand, but our geography teachers, we are afraid, are too frequently absorbed by other branches of instruction, and, in their case, small handbooks, embodying the results of most recent research, are doubly useful. The books now under notice are well calculated to meet this want. It is rarely we have read a more attractive treatise than Mr. Grove's Introduction to Geography. In a hundred and twenty pages the author explains the scope of geography, teaches the use of maps, and treats lucidly on some of the most striking phenomena of physical geography, illustrating his meaning by capital diagrams. Mr. Johnston's "Book of Physical Geography" fully bears out the author's reputation as a painstaking and conscientious geographer. The multitude of facts with which he has to deal is arranged in a perspicuous manner, and it only needs the perusal of a few pages in order to find out that we are presented with the results of a study of original authorities, and not with contents of some pre-existing larger work, boiled down to the dimensions of a school-book. The work is illustrated profusely with maps and diagrams.

Mr. F. Tozer's "Classical Geography" is equally good in its way. We are glad to find that the author does not confine himself to a bare enumeration of countries, towns, and mountains, but draws attention, on every suitable occasion, to the influence exercised by geographical surroundings upon a nation's destinies. If the teachers for whom this little work is intended are capable of acting in accordance with the author's intention, they will impart life and interest to lessons which, where confined to a mere recapitulation of names, always prove exceedingly repulsive.

———:o:———

Spon's Information for Colonial Engineers: India. By *F. C. Danvers, Assoc. I.C.E.* (London, 1877.)

This little work is designed to supply general information of value concerning India to those who contemplate a career in the Public Works Department in that country. It opens with a brief description of the geography and physical condition of the country. We have then an account of the different building materials available in the various provinces of India, including bricks, cement, and timber. A brief account of roads, bridges, and railways follow, with particulars of the cost per mile of some of the chief of these in India. A chapter on irrigation describes the four classes of irrigation works in India, viz., inundation canals, irrigation canals, canals in river deltas, and tank irrigation. The chapter on lighthouses contains particulars concerning the construction of some of the chief of these structures. A reference to the recent complete list of lighthouses and ships recently published by the Government of India, would have here been useful. In appendices we find particulars respecting the rules of the Public Works Department; next a list of the principal trees in India, with notes respecting their suitability for building purposes; and, lastly, a list of Indian weights and measures, and a glossary of native terms. There are a very few blemishes in the work which we have noticed in glancing through. For instance, in treating of the physical geography of India, this is discussed with reference to the administrative divisions, which make it appear that Mysore and Coorg are not in the Madras Presidency. There is some confusion, too, in the way in which Bengal is spoken of, it not being apparent what portion of country is meant by it; the Salwen is omitted from the list of rivers of British Burmah, and Dodabetta instead, one of the Anamallay peaks, is spoken of as one of the highest mountains of Southern India. But these are minor matters, which cannot detract sensibly from the usefulness of the work, which will be appreciated by embryo Indian civil engineers.

———:o:———

Brief Account of the Royal Forest School at Vallombrosa. By *Hugh Cleghorn, M.D.*

Forest conservancy is now an important department of administration in most of the countries of Europe, including even Spain, and the details of the arrangements that have been adopted by the various governments are very interesting. As regards geography, forest administration is important, in connection with the effect of human agency on the physical condition of the earth. Italy, like most other countries, has suffered from the wasteful denudation of her formerly wooded tracts to the detriment of the climate, to the poverty of the country, and to the marring of her beauty. Dr. Cleghorn gives an account of the steps she has taken to regain the damage done in previous centuries, having in May 1875 visited the forest school and estates at Vallombrosa and Paterno in the Apennines, about 30 miles from Florence. Paterno is 1215, and Vallombrosa 5556 feet, above the sea. In 1867 the present Director, Cav. Adolfo di Bérenger, was appointed to organise and superintend the forest school. The school was formally opened in August 1869, and now has a Director and five Professors, a library of 2000 volumes for forest literature, two arboretums, plantations, and nurseries. Dr. Cleghorn gives an account of the course of study for the pupils, and other particulars respecting the Vallombrosa establishment. The official organs of the school are the *Giornale di Economia Forestale* and the *Bollettino Forestale*, both published at Florence.

Cartography.

——:o:——

Since Siebold and Arrowsmith published their Maps of Japan our knowledge of that country has been much increased, and the interest taken in it is no longer dictated by curiosity only, but is due, in a large measure, to commercial transactions on a large scale. Mr. Brunton's map of these "British Islands" of the Pacific[*] meets, therefore, a real want. The author has been Engineer-in-Chief of the Japanese Lighthouse Department; he has seen much of the country, and his official position rendered accessible to him many sources of information, which are not as a rule available. This map is mainly based upon British Admiralty surveys, and a large number of native maps. The explorations of European travellers have likewise been consulted, but they furnished but comparatively little information, as the interior of Japan has not hitherto been as accessible as might have been supposed from the eagerness with which the Japanese have introduced a good many European institutions. The map cannot, therefore, compare in accuracy with our delineations of European countries. There is, more especially, a great lack of altitudes, but it is, nevertheless, a vast improvement upon older maps. It is, in fact, the only map of Japan which can be consulted with confidence. The names of places have been spelt in accordance with the phonetic system adopted by Japanese scholars, and they have been revised by Mr. Satow, the interpreter of the British Embassy. We hope the Admiralty will take a note of this fact, and accept the same mode of spelling for their charts. Naval officers cannot, indeed, be expected to have a thorough knowledge of the languages of the countries which they are ordered to survey, but competent scholars should in all these cases be consulted, in order that the correct names may be ascertained, and annoying confusion in our geographical nomenclature may be avoided.

---

[*] Nippon (Japan), 1876, compiled by R. Henry Brunton, C.E. 4 sheets. Scale, 20 miles to the inch. London (Trübner & Co.), 1877.

Mr. Brunton's map shows railways in operation and proposed, high-roads, bye-roads, telegraphs; towns, which were formerly the residence of nobles; capitals of the kens, or districts, and the boundaries of these latter. Appended to it are several valuable statistical tables. From these we learn that the area of Japan is about 150,000 square miles (a more exact determination of the area of each ken would have proved acceptable), and its population 33,211,093 souls. There are 70 miles of railway and 2760 of high-roads. At the seven towns open to foreign trade (Yokohama, Hiogo, Ozaka, Nagasaki, Niigata, Hakodate, and Yedo), there resided, in 1875, 2581 Europeans and Americans. The value of the imports was 29,467,067 dollars, and that of the exports 18,014,890 dollars. The revenue of the empire for 1875-6 was estimated at 68,600,000 dollars; there was paper money in circulation representing 94,800,000 dollars; and the national debt had grown to the respectable sum of 142,300,000 dollars.

Mr. J. Kips has compiled a map showing the Roman Catholic Dioceses, Churches, Convents, and other religious institutions throughout Great Britain. He appears to have done his work conscientiously. These institutions are of course most densely packed together where Irishmen most do congregate, but there is hardly a county without its Roman Catholic religious establishment, and convents appear to have been placed by preference in localities where there are no Roman Catholics at all.

Mr. Stanford has published an excellent Map of Turkey in Europe, &c., which embraces the whole of the countries surrounding the Black Sea, the Eastern Mediterranean, and the Caspian Sea, and will enable the readers of newspapers to follow the operations of the contending armies in Europe and Asia. The names are printed legibly, and spelt, as a rule, consistently with the rules almost universally adopted by English geographers. A "Popular Map," issued by the same firm, supplies hardly more information than may be found in an ordinary atlas. Jankowsky's "Russo-Turkish War Map" (Stanford) is one of those attempts at pictorial delineation of a country which must be done well and characteristically to give satisfaction. Mr. Jankowsky's map can hardly be said to be a satisfactory performance, and we should certainly give the preference to an ordinary map.

The *Illustrated London News* has begun the publication of a series of war maps, several of them drawn on a large scale. Maps of the Lower Danube and the Dobruja, of the Seat of War in Asia, the environs of Kars, the Danube and the Balkans, and the Black Sea have already been published.

The Drainage Map of Colorado, first published by the United States' Department of the Interior, affords evidence of the progress making in the geological and geographical survey of the territories now carried on under the superintendence of Professor F. V. Hayden. The primary triangulation was conducted by Messrs. J. T. Gardner and A. D. Wilson: for the topography we are indebted to Messrs. Wilson, J. R. Bechler, H. Gannett, J. B. Crittenden, and S. B. Ladd. The map is drawn on a scale of 12 miles to the inch, and we need hardly say that it contains much that is new. The rivers, printed in blue, are the most prominent feature; but roads, settlements, and trigonometrical points have likewise been inserted, and although the hills are not shaded, numerous altitudes afford some idea of the features of the country. The following are the culminating summits:—

Long's Peak, 14,271 feet; Mount Evans, 14,430 feet; and Pike's Peak, 14,147, in the Colorado or Front Range.

The Spanish Peaks, 13,620 feet.

Mount Powell, 13,398 feet, and Mount Lincoln, 14,286 feet, in the Park Range.

Mount of the Holy Cross, 14,176 feet, and Massive Mount, 14,368 feet, in the Sawatch Mountains.

Blanca Peak, 14,464 feet, in the Sangre de Cristo Range.

Maroon Mount, 14,000 feet, in the Elk Mountains.

Uncompahgre Peak, 14,236 feet.

Pidgeon's Peak, 13,928 feet, in the San Juan Mountains.

Mount Wilson, 14,280 feet, in the San Miguel Mountains.

Log Book.

——:o:——

Promotion of Dr. Colan.—On the return of the Arctic Expedition, after achieving a great success, and securing most valuable scientific results, the usual promotions took place among officers and men, those of the officers being gazetted on November 3rd, 1876 (see our number for December 1876, p. 335). Dr. Colan, the Senior Medical Officer, was to be promoted to the rank of Deputy Inspector of Hospitals and Fleets; but in this grade it is necessary to wait for a vacancy, which was soon about to occur. Last April his promotion was also gazetted. We heartily congratulate this distinguished medical officer on the recognition of his services. To his professional skill, and, even more, to his incessant care and watchfulness, gentle, sympathetic kindness, and admirable nursing, the rapid and complete recovery of the men attacked by scurvy is due. Dr. Colan always acted in perfect accord with Captain Nares, and formed a popular member of a most united and happy mess.

The necessary delay in the announcement of this promotion has been used as a means of shameful misrepresentation, and of several false insinuations by unscrupulous writers, who have vainly striven to depreciate the admirable work of the Expedition. Praise such as has been bestowed on Dr. Colan, with the object of injuring his chief, must have been far more annoying to him than abuse. He formed one member, cordially acting with the others, of the most united Expedition that ever crossed the Arctic Circle.

Baku as a Central Point of the Overland Route to India.—The *Russische Revue* (Part II. of 1876) gives an important paper on the above subject by W. Fabritius, of Helsingfors University. The chief point on which the argument hangs is one which appears in the latter part of the article, *i.e.*, that a *great circle* traced from any point whatever in Central Europe to Central India will intersect or pass near the Caucasus, and that, therefore, this route offers the shortest line for railway communication between the two places mentioned. In the first part of the essay the importance of the natural resources of the shores of the Caspian are cited, viz., petroleum, sulphur, white naphtha from Cheleken; timber, cotton, rice, and madder from Daghestan; lime and gypsum from Krasnovodsk; and, lastly, carpets, mats, and embroidered cloth from the Persians and Turkomans. A geographical sketch of the Caucasus, with its stupendous mountain barrier to the north, is given, and the disadvantages of Tiflis, which is situated in a sort of *cul-de-sac*, surrounded by mountains, are shown. Neither the Georgian road nor the Poti railway, both in themselves far from successful public works, can possibly redeem the bad position of Tiflis, which is anything but accessible from Europe. Baku, on the other hand, can be reached in one, two, or three days' journey from Astrakan, Petrovsk, Derbent, Gurieff, and other chief points along the Caspian. A railway from Baku across the Apscheron peninsula to Vladikavkaz and Rostov would encounter no great physical difficulties along its course (435 miles), and would prove of great benefit in uniting Trans-Caucasian regions to the Russian system. From Baku southward, M. Fabritius would carry the railway along the shore of the Caspian up the Sefi-rud and across the mountain range by way of Kazvin and Kum to Teheran, thence to Ispahan, and afterwards south-east to Bender Abbas, from whence it would bend southwards for about 100 miles, and then, turning eastward, follow the almost straight coast of Beluchistan, ultimately joining the railway system of India at Fort Manura on the Indus. The total length of such a line from Baku would be 2200 miles. The author considers that the only important obstacles would occur in the ascent up the valley of the Sefi-rud to the Persian plateau, and the descent to the coast. The safety of the line in Belooch territory would be secured by constructing it sufficiently close to the coast, and stationing a few ships of war in the Arabian Sea.

The Darien Exploring Expedition.—The expedition, under command of M Lucien N. B. Wyse, of which we gave an account in our number for February, p. 45, returned to Panama early in April. No details respecting the surveys have yet been made public; but M. Wyse has expressed his conviction, based on the results of these surveys. that the inter-oceanic canal will soon be made through Colombian territory.

Colombia.—We rejoice to hear that the civil war in the United States of Colombia has come to an end. It was fomented by the priests, and its object was to prevent the establishment of a sound system of education. For this end the unfortunate country has been suffering all the evils of war since last July. Fortunately, the Government has at length succeeded in entirely defeating the insurgents, and restoring order. The rebellion, instigated by the Bishop of Popayan, began in the State of Cauca, and the first blood was shed in Palmira on the 10th of July, 1876. On the 31st of August, General Truxillo defeated the rebels in the battle of Los Chancos, and on the 6th of April, 1877, the insurgent Governor of the State of Antioquia, Silverio Arango, capitulated at Manizales. This ended the war. It is worthy of note that there has never been a successful revolution in Colombia since the independence, and that, when legitimate authority has been attacked, it has always successfully held its own. General Truxillo will probably be elected President of Colombia at the expiration of the term of office of Dr. Parra, the present Chief Magistrate, in March 1878.

Correspondence.

—:o:—

THE KANKALIS.

To the Editor of the "Geographical Magazine."

Dear Sir,—In my last letter I discussed the question of the ethnology of the Pechenegs, whom I ventured to identify with the Karakalpaks. I omitted to refer to the old English traveller, Bell, of Antermony, who mentions that the Karakalpaks, in 1715, still inhabited the deserts east of Samara, and that they could muster altogether about 10,000 or 12,000 men (*op. cit.*, *in Pinkerton*, vii., 279 and 280). Three of the tribes of the Pechenegs, according to the Emperor Constantine's account, belonged to the race of the Kankar. With your permission, we will now consider the history of this very interesting race.

The name, as we shall see, occurs in several forms. Rubruquis calls them Cangle, and he connects them closely with the Comans—"Comani qui dicebantur Cangle," "Cangle quœdam parentela Comanorum," are two of his phrases (*op. cit.*, *ed. Soc. de Geogr.*, 265 and 274). Plano Carpini, who calls them Cangites, tells us merely that their land lay east of that of the Comans, and that they entered it on the 16th of April and left it on the 17th of May, being thus thirty-one days in crossing it. On leaving it they entered the land of the Bissermans or Musselmans (*op. cit.*, *ed. D'Avezac*, 749). In the narrative of Brother Benedict, we read that Comania extended as far as the Yaik, where the land of the Cangites commenced, and reached as far as Turkya or Turkey (*id.* 777). Rubruquis tells us that the land of the Cangle began at the Volga, and that he was travelling through it from the feast of Holy Rood to that of All Saints (*id.* 274 and 276).

Having defined the western limits of the Kankalis at the time of the great Mongol invasion, let us now turn to the eastern frontiers. In the account given by Raschid and others of this invasion, we find the Kankalis occupying the lower courses of the Jaxartes, and the country bordering the Sea of Aral on the north and east. They were subject to, or, at least, dependent upon, the Khuarezm Shah Muhammed. This dependence commenced when Takish the father of Muhammed married Turkan Khatun the daughter of the Kadr Khan of Kipchak (*Tabakat-i-Nasiri*, 254). The latter is called Akran, or Ikran, by the author of that work (*id.*, 240). D'Ohsson calls him Jinkeshi, and tells us he belonged to the tribe Bayaut. According to the biographer, Muhammed, of Nessor, the Bayauts were a section of the Yemeks, and D'Ohsson says the Yemeks were undoubtedly comprised under the generic name of Kankalis (*Histoire des Mongols*, i., 196 and 197). She was a person of very great power and consequence, and was styled Khudawandah-i-Jahan (Princess of the Universe) (*Tabakat-i-Nasiri*, 241). In her suit many of her relatives passed into the service of Muhammed, and with them large bodies of the Kankalis. They were planted as garrisons on the frontier. Thus one of them named Inaljuk, and who was entitled Ghair Khan, which is probably a corruption either of the Gur Khan or, as the author of the *Tabakat-i-Nasiri* makes it, of Kadr Khan, was, according to Abulghazi, given the government of Turkistan. He had his capital at Otrar; he was the son of the younger brother of Turkan Khatun's father, and, therefore, her cousin, and we are told the title of Ghair Khan was conferred on him by Muhammed (*op. cit.*, *ed.* Des Maisons, 37). Khumar Tikin, the brother of Turkan Khatun, who, like Ghair Khan became a Musselman, was appointed darugha, *i.e.*, governor of Urgendy. Another leading Kankali, named Kuk, was given the command of Bokhara (*id.*, 37 and 38).

The Kankalis formed the greater part of the garrison of Samarkand, and were put to death there to the number of 30,000, with their chiefs Barishanaz Khan, Togai Khan, Sarsig Khan, and Ulag Khan. (D'Ohsson i., 238 and 239). Amin Malik, the Governor of Herat, was Turkan Khatun's brother, and had a following of 20,000 Kankalis (*id.* i., 297). One of Muhammed Khuarezm Shah's wives was also a Kankali. She was apparently the mother of his son Arzalu Sultan (*Tabakat-i-Nasiri*, 279).

Altogether, according to Abulghazi, the number of Kankalis who took service under Muhammed Khuarezm Shah, was 50,000 or 60,000. Ten thousand families of Kankalis lived on the banks of the Chu and the Talas, but on the arrival of Chingiz Khan all those who lived on the Talas were conquered, and their country ravaged, and thus ended the separate history of the Kankalis (*op. cit.* 38).

It would, therefore, seem that the Kankalis, at the approach of the Mongols, occupied the whole country north of the Aral, from the Yaik to the Talas. They were very closely related to the Kipchaks, and seem, in fact, to have formed but a section of the same race. Thus, in the Tabakat-i-Nasiri, the name Kipchak is given to their country, and we know that, even at this day, one of the main divisions of the Uzbegs is called Kipchak Kangli.

Among the shreds of the Kankalis who escaped the Mongol arms was a small tribe called Kayi Kangli, which dwelt at Mahan, near Meru. On the Mongol approach, they retired westward into the district of Akhlatt, in Armenia. Eight years later when the Mongols appeared there, they again retired into Asia Minor. Their chief was named Ertogrul. He and his people, consisting of about 440 families, obtained the grant of a district near Angora, from the Seljuk Sultan of Rum, and he was given the title of Udj Beg, or Margrave. He was the father of the famous Othman, or Osman, the founder of the Ottoman Empire (D'Ohsson, i., 293 and 294). So that the Ottomans proper, the original nucleus of the race, were Kankalis. This leads us into a curious by-way ef our inquiry, which I think interesting.

The Chinese, as De Guignes long ago showed, called the Kankalis, Kangkiu, which reminds us of the form Kangar, used by the Byzantines, and the Kangites of Carpini. Under this name they apparently included the Kipchaks and the Pechenegs. They tell us the Kangkiu were divided into nine small kingdoms, which reminds us that Constantine Porphyrogenitus tells us the Pechenegs were divided into eight Themata, and further, the names Tsao, Ho, and Su, which they give to three of their kingdoms, correspond to the three names *Tzo*pan, *Cho*pan, and Tzur. This has all been noticed by Von Hammer (*Geshichte der Goldenen Horde*, 6).

In Schmidt's criticism of the work just cited we are told that among all the peoples of Central Asia, Mongols, as well as Turks the Osmanli, to this day are known as Khangar (*id.* 608). This is a curious confirmation of the fact I have already mentioned, that the nucleus of their race was the small tribe of Kayi Kangli, who left Khorassan on the invasion of the Mongols. In a Paper by Dr. Schott, published in the *Berlin Transactions* for 1844, and entitled "Chinesische Nachrichten uber die Kanggar und das Osmanische Reich," we have some curious information on this subject. In a small Chinese book published in 1777, and entitled *Si in wen kian lo*, is a curious account of the Russians, who, we are told, were then governed by a female Khan. They are described as having been at war in the twentieth year of Kien lung, *i.e.*, in 1755, with the Kanggar, which Schott agrees with Schmidt is the name by which the Osmanli are now known in Central Asia (*op. cit.* 156). The account is very quaint in its details, and makes the war terminate by the Russians becoming tributary to the Kanggar, and having to submit to pay an annual tribute of 500 boys and 500 girls to the victors. All this is the manufacture of Chinese patriotism, nor does the date seem to be correct; but the account, as Schott says, doubtless refers to the war which the Empress Catharine fought against the Turks, in the years 1769 to 1774, and which ended in the peace so disastrous for the latter, secured by the treaty of Kuchuk Kainarja (*id.* 158.)

The Kankalis or Kanklis derive their name, according to Abulghazi (who was himself a Turk, and also according to Raschid), from the word kank, a chariot, cart, or araba (*ed. Des Maisons*, 17). M. Schott says, that among several tribes of Siberia a cart is still known as kanga, and he explains how naturally a Chinese would convert Kankli into Kangkiu, which is a similar change to the Latin *conclusum* when it becomes the Italian *conchiuso* (*op. cit.*, 154, note). Kangkiu, then, is the transcription into Chinese orthography of the name Kankali, but as Remusat long ago showed a tribe of Turks, famous in the Chinese annals, bore the name Kaoché, which in Chinese means the same thing as Kankli in Turkish (*Researches sur les Langues Tartares*, 315).

On turning to Dr. Bretschneider's admirable work recently published, entitled *Notices of the Mediæval Geography and History of Central and Western Asia*, we find it stated that Kaoché means high cart in Chinese, and he tells us further that in the history of the Wei (*i.e.*, in the fifth century of our era), the name of this people is explained by the high wheels they used to put on their carts. Now the character ché is also read kiu; and in the biography of Buhuman, who belonged to the Kankali tribe, and which is given in the Yuenshi, it is expressly said that the Kankali's derived their origin from the Kaokin, a people mentioned in the *History of the Han* (*op. cit.*, 74, note 143). This proof is conclusive, and enables us to carry back the history of the Kankalis to an early date. I hope to be permitted to trace the story further on another occasion; now, we must revert somewhat. Meanwhile, I would mention, as a fact of perhaps some interest to my friend, Colonel Yule, that Von Hammer says that the Chinese Kaoché is the same word as the Turkish Kochi, and the English coach (*Golden Horde* 17, note 2). I have sufficient sins of my own to answer for without being answerable for Von Hammer's etymologies, but this one certainly seems reasonable and interesting.

As I have shown, the Kankalis, at the time of the Mongol invasion, occupied the whole country from the Yaik to Turkestan. From the notice of Constantine Porphyrogenitus we gather that they were in this neighbourhood more than two centuries earlier. Now it is strange that we do not meet with the name in the pages of the earlier Arab geograpers; so strange, that we are led to inquire whether the race was not known to them under some other name. On turning to Edrisi, the Nubian geographer who wrote in the 12th century, we find the following passage:—"To the east of Lake Aral is the country of the Kandaghases, brave and independent tribes of the Ghoz race" (*op. cit.*, *ed.* Jaubert ii., 339). There can be no doubt that the Kandaghases of this passage are the Kankalis of other writers, Edrisi's orthography being very corrupt. We therefore get on the track that the Kankalis, who were so styled indigenously, the name being a Turk name, were in fact no others than a section of the Ghoz of the Arab writers, and this is amply confirmed by what we know of the habitat and other idiosyncracies of the Ghoz.

The general name Ghoz included, as I believe, both the Kipchaks and the Kankalis. The former, as I argued in a former letter, only appeared in the steppes of the Kuma about the year 1050, and came from Armenia, and had reached there, along with other Ghoz tribes, who had invaded the west under the early Seljuki princes. The Kipchaks, before they crossed the Jaxartes, probably lived to the north-east of the Kankalis, somewhere near Lake Balkash. It is this eastern Kipchak to which Edrisi refers so very curtly in the 9th section of the 6th climate of his work under the name of Khafchakh (*id.* 416). It was thence, as I believe, that those Kipchaks, who form such a notable element in the Uzbeg and Kirghiz Kazak confederacies, and who dominated until lately over large districts of Ferghanah, originally came.

I hope to continue the examination of the history and origines of the Ghoz or Oghuz in another letter. In conclusion, will you permit me to thank Professor Vambery for his courteous answer to my question. I notice that Dr. Schott, in the memoir already cited, gives the same etymology of the name Bajnak, or Pecheneg, that is given by Von Hammer. Strahlenberg, in his quaint old book, derives the name from Pech, or Piech, which he says is the literal translation of Hund, a dog, and connects them with the Hungarians. May I ask M. Vambery another question? In working out the topography of the country of Ghoz, I have been very much puzzled to find the site of Jund, or Jend, a famous town very often mentioned in the history of the twelfth century, and captured by Juchi, the son of Chingiz Khan. I notice that M. Vambery in his *History of Bokharah*, says, "About the same spot now occupied by Gidjdovan, lay the considerable town of Jend, the frontier fortress towards Khuarezm" (*op. cit.* xxvi.) I cannot find this place Gidjdovan on my maps, and should like to know its whereabouts; and also M. Vambery's reasons for fixing Jund there. I cannot find in any of the passages where Jund is mentioned, and which are accessible to me, any definite information about its exact locality. Perhaps the question is discussed in M. Lerch's paper on the Archæology of the Valley of the Jaxartes, which it is a great pity is not translated. It would be a very welcome addition to your pages, and would not run over a great space.

I remain, yours &c.,

HENRY H. HOWORTH.

DERBY HOUSE, ECCLES.

———:o:———

THE AMAZON AND ITS TRIBUTARIES.

To the Editor of the "GEOGRAPHICAL MAGAZINE."

SIR,—In the numbers of April and May of your magazine I have read a paper of Colonel Church, on the "River Purûs;" and a letter of Mr. Chandless, on "Barometrical Heights in the Amazon Valley." The two distinguished explorers differ as to the height of Manáos above the sea level; and as the question they raise is not without interest to science, I venture to make a few remarks on the subject.

Colonel Church gives a number of barometrical observations in his paper, made by various explorers; their results vary from 90 to over 1400 feet as the elevation of Manáos above the sea; and as such differences are clearly unsatisfactory, Colonel Church has virtually dropped these observations, preferring to level up the river to Manáos, taking for his guidance my observations on a similar great river. Colonel Church being aware that the inclination or fall of the Paraná is under half-an-inch per mile, thereon argues, I think correctly, that since the Amazon is the greater river of the two, its inclination would be probably less; that, accordingly, the height of Manáos, 1000 miles from the sea, would be under 500 inches, or under 42 feet. As a further proof of the gentle inclination of the Amazon's surface, Colonel Church states that the tide of the sea, not exceeding 12 feet at Pará, was observed 530 miles up the Amazon; while on the Paraná a similar tide is not perceptible 200 miles from the river's mouth (see *Hydraulics of Great Rivers*, Rosario Section). This seemed further to indicate that even half-an-inch per mile is an excessive estimate for the inclination of the Amazon.

Mr. Chandless disagrees in this respect from Colonel Church, saying "that Colonel Church seems to think even this height (92 feet) too great, because the tide reaches more than half way to Manáos, although the tidal rise at Pará is only 12 feet. But in this Colonel Church treats the tidal rise up a river as one of level only, neglecting the momentum; on which principle the tide ought to rise in the Bay of Fundy no more than it rises in the Atlantic outside."

Now, the comparison between a tidal wave entering the mouth of a river, and a similar wave entering a bay, does not hold at all. Moreover, the momentum of a mass in motion can only exert itself in the direction of the movement. Since, however, nobody suggests that the current of the Amazon is reversed by the tidal wave hundreds of miles above Pará, no "momentum" can possibly come into consideration; the mass of water rolling down the Amazon Channel towards the sea, and not the reverse way in the direction of the tidal wave.

That the tidal wave "apparently" travels up the Amazon some 500 miles from the sea, and that its effect is felt so far up the river, is due to another cause. The movement is, in reality, an oscillation of the river's surface in the vertical and not horizontal direction; and this oscillation is produced by the river. From the whole discharge of the river per second, that part is impounded in its channel—producing the vertical rise of its surface—which, on account of the rise of the sea at the river's mouth, could not be discharged at the time.

It does happen, on some rare occasions, that the current of a great river is reversed near sea, on account of an exceptional and sudden rise of a tidal wave, due to storms, &c. I once observed this within the Paraná, the current having been reversed at its mouth, and was reduced to zero some 60 miles higher up. At greater distances, however, the river flowed on, as usual, with its varying velocity, within its tidal reach, impounding water at one time and discharging it at the other.

In conclusion, allow me to say a few words about barometric measurements, upon which Mr. Chandless gave an interesting account from his own experience.

Under certain conditions, a barometer or an aneroid, in the hands of a skilful observer, are most valuable instruments. For small differences of level, say, up to 100 feet, the two localities under observation should be near each other—not over ten miles—if the observation is to be worth anything. As the difference in the levels become greater, so the distance between the two localities may increase without seriously affecting the result by atmospheric waves or disturbances.

I have meteorological weather charts before me, in which the sea all round Great Britain and Ireland is marked "smooth" and "very smooth;" sky cloudy; gentle currents of air almost in all directions. Yet, the atmospheric pressure was by no means the same at the surface of the sea—that is, not the same in the true horizon. There happened to be on that very day, over Great Britain and Ireland, steep "atmospheric gradients" of more than $\frac{1}{10}$ inch mercury within two points only 100 miles apart; so that, if barometric or aneroid observations had been simultaneously made at the two localities on that "apparently" favourable day, then the level of the sea at the one station would appear about 100 feet higher than at the other; whilst, on the next day, the atmospheric gradients may be reversed—now showing 100 feet depression instead of elevation. Both results would be wholly erroneous, yet they would be obtained from correct barometric observations.

I mention these facts to show that great caution is required in this kind of observation, if we are to receive information, and if we are not to be misled.

Yours, &c., J. J. RÉVY.

NOTE.—The maps which Mr. Saunders is preparing, to illustrate the defence of his views on the Himálaya Mountains, are too elaborate to be completed in time for our present number, but they may be expected in the next. The route of the Pundit Nain Singh from the borders of Ladak across the Hor Pa to Lhasa, and thence by Towang to Udalgiri, in Assam, will be included in one of these maps; and on that account Capt. Trotter's paper on that subject, read before the Royal Geographical Society on the 14th ult., is also postponed.

Proceedings of Geographical Societies.

—:o:—

PARIS GEOGRAPHICAL SOCIETY.

March 21st, 1877.—M. E. LEVASSEUR in the chair. Sir Henry Rawlinson occupied a seat near the President. It was announced that the remains of the Marquis de Compiègne had been buried at La Chaise, the residence of his family.

Prof. MARRE DE MARIN announced the completion of a grammar and dictionary of the Malgash language.

M. ESTOURGIS communicated some details on a commercial and scientific mission which Messrs. Cockerill, of Seraing, had despatched to the Transvaal. M. Jaquemin, its chief, had returned to Belgium, with propositions for the construction of a railway from Delagoa Bay to Pretoria.

Lieut. A. DE BIZEMONT reported on the astronomical observations sent home by M. Savorgnan de Brazza. The furthest point referred to is N'gheme in Aduma, 1° 7′ 50″ to the east of Lope.

Dr. BROCK communicated particulars on the recent Norwegian exploration of the Northern Atlantic, between Norway and Iceland.

April 4th, 1877.—Baron DE LA RONCIERE LE NOURY in the chair. The President announced that a French committee had been formed in connection with the International Association for the Exploration of Africa, established at Brussels. Of this committee M. de Lesseps would be President.

Mr. WILLIAM HUBNER then read the Report of the Commission appointed for the consideration of the geographical labours entitled to receive the Society's prizes.

Commander Cameron, who was present, was awarded the Gold Medal of the Society, Captain Roudaire received likewise a Gold Medal; MM. Léon Pérrièr and de Folin received a Silver Medal for their works on the bottom of the sea; and M. Gabriel Gravier was awarded the money-prize founded in memory of M. de la Roquette, as an acknowledgment of the merits of his work on the Norman discovery of America.

M. E. ANDRE read a paper on his travels through Southern America in 1875-6.

The following were elected members of the Central Commission:—Baron de la Roncière le Noury, President; Commandant Mouchez and M. E. Desjardins, Vice-Presidents; MM. Fournier and Bionne, scrutineers; and M. Julien Thoulet, Secretary.

April 18th, 1877.—M. E. LEVASSEUR in the chair. The President announced that they had determined to issue debentures, with a view of defraying the cost of erecting their own residence.

M. MAUNOIR read the correspondence received, amongst which were letters from the family of the late M. de Compiègne and the Committee of the Egyptian Geographical Society. In the letter it was stated that the most cordial relations existed between Dr. Schweinfurth and the deceased, up to the time of the latter's death.

The MINISTER OF EDUCATION announced that £400 had been granted towards M. Largeau's expedition.

M. GRASSET D'ORCET writes to say that he has been struck by the bearings of the Monument of Karnak being the same as those of Solomon's Temple, and its eleven rows of stones, which can refer only to the solar cycle of the Rudras, or to that of eleven letters on the vases of Hissarlik.

DR. A. MORICE proposes the establishment of a Zoological Museum, in which the animals shall be arranged according to countries, and not according to the present method.

M. HAVARD announces that the representatives of the *Chambres Syndicales* and of their own Society had constituted themselves as a *Comité de délégation géographique*, of which M. Cortambert was President.

The MINISTER OF FOREIGN AFFAIRS communicated a statistical notice on Trans-Vaal, which had been received from the French Consul at Cape Town.

M. H. DUVEYRIER read a paper on Stanley's Exploration of Lake Tanganyika and the Lukuga Creek.

Dr. E. Hamy read a paper on the Alfurus inhabiting the island Gololo, which had recently been visited by M. Raffray.

M. J. THOULET demonstrated the importance of the gnomonical projections.

—:o:—

BERLIN GEOGRAPHICAL SOCIETY.

May 12th, 1877.—Baron RICHTHOFEN read a paper on the roads followed by the silk trade, according to Ptolemy and the Chinese authorities. A lively discussion ensued, in which Dr. H. KIEPERT and others took part.

The Delegates of the Society for the Exploration of Equatorial Africa were present at the meeting. It was announced that Dr. Nachtigal proposed to start for Western Africa next year. In the meantime, it is proposed to despatch a pioneer explorer, to follow in the footsteps of Pogge and Mohr. The expenses of this expedition will be borne conjointly by the old German African Association and by the German branch of the International Society.

—:o:—

VIENNA GEOGRAPHICAL SOCIETY.

March 27th, 1877.—Baron HELFERT in the chair. General STEPHAN VON TURR read a paper on the proposed Darien Canal. The expedition organised for the examination of this project started in November 1876. It is commanded by Lieut. Lucien N. B. Wyse, assisted by Lieut. Reclus, Captain Bixio (since dead), Dr. Viquiez, Mr. Brooks, a geologist, M. Celler, and six engineers. On the 3rd December, 1876, the members of this expedition arrived at Panama, and, accompanied by M. Aizpuru, the President of the State, they started at once for Chapigana, on the inner bay of the Gulf of San Miguel, where their labours begun. This is a fine harbour, and Urabu, on the Atlantic coast, offers equal facilities. The proposed canal will have a length of 143 miles, including 46 miles of the Atrato and 43 of the Tuyra, which can be rendered navigable at small expense. At the confluence of Tuyra and Pucro the elevation above the sea is 92 feet, and it appears from a reconnaissance that the height of the water-parting at the head of the Tihule does not exceed 230 feet. Dr. Maack, who was attached to the American Expedition as Geologist, ascertained that the two oceans formerly communicated near this spot. The fossils discovered belonged to species still existing in the two oceans. The engineers would, therefore, only have to break through this barrier, which had been formed by an upheaval of the tertiary strata.

April 27th, 1877.—Dr. VON HOCHSTETTER in the chair. The Emperor of the Brazils was present at the meeting. The President, in welcoming his Majesty, stated that the Society was indebted to him for a valuable collection of geographical works on Brazils.

Dr. H. ABICH read a paper on volcanoes and earthquakes in the Caucasus.

Dr. O. LENZ then gave an account of his explorations on the Ogowe, Gabun, and Muni.

Lieut. WEYPRECHT explained the system of synchronous meteorological observations, which he proposed should be made at the international observatories which it was proposed to establish in the Arctic regions.

THE DANISH GEOGRAPHICAL SOCIETY.

We have received the two first numbers of the Proceedings of the Danish Geographical Society (*Det Danske Geografiske Selskabs Tidshrift*), edited by the secretary, Professor Erslev. We have already announced the formation of this Society in November 1876, and we rejoice to see that it has already become a marked success. There are now 750 members, of whom 100 are ladies. His Danish Majesty is Patron, and the Crown Prince is President of the Society. The Vice-Presidents are Vice-Admiral Stein Bille, the distinguished officer who conducted the voyage of the 'Galathea' round the world in 1845-48; Count Holstein Holsteinborg; Rear-Admiral Irminger, the learned geographer and valued honorary correspondent of our own Society. Professor Erslev is Secretary; and among the Council are Professor Engelhardt, Captain O. Irminger, Professor Johnstrup, Dr. Rink, the learned Director of Greenland Trade, and Captain Rothe, the Hydrographer. The Society holds its meetings in an apartment of the Christianborg Palace.

At the first meeting, Admiral Irminger gave an account of the work and results of the late English Arctic Expedition; Mr. Hoffmeyer read a paper on the Meteorology of Greenland. At the second meeting, a very interesting paper was read, by Mr. J. C. Petersen, an Assistant in the Hydrographic Office, on the changes that have taken place in the Agger Canal, in the Limfjord of Jutland. It is illustrated by a map showing the state of the Agger Canal in 1695, 1791, 1849, 1855, 1867, and 1874. The first number also contains a paper entitled "Life in Omsk," described by Mr. E. Hansen, an official of the telegraph station. Dr. Rink contributes a paper, on the Present Condition of Greenland, to the second number; which also contains an account of the Nicobar Islands, by Admiral Stein Bille, who visited them during his voyage in the 'Galathea;' a paper on the proposed canal through the Darien Isthmus, by Professor Erslev; and another entitled "Sketches from Siam," by Captain A. de Richelieu, of the Siamese navy, who is an excellent surveyor. He has recently supplied Captain Taylor, our Superintendent of Indian Marine Surveys, with a valuable survey of Junk Ceylon. Each number also contains numerous short geographical notices, and is illustrated by neatly lithographed maps.

——:o:——

ITALIAN GEOGRAPHICAL SOCIETY.

February 23rd, 1877.—An important meeting was held, at which an unusual number of members and visitors were present. Among these were Senators and Deputies of the Italian Parliament; Generals Longo and Garneri; the ex-Minister of Foreign Affairs, Marchese Visconti-Venosta; the Marchese Guenieri-Gonzaga, and other persons of note.

His Royal Highness Prince Humbert came in punctually at eight o'clock, accompanied by his chief aide, General de Sonnaz, and was received by the President of the Society, Signor Commendatore Correnti, and the following members of the Board of Direction:—Messrs. Maraini, Allievi, Garavaglia, and Guastalla. The chief guest of the evening, His Majesty the Emperor of the Brazils, did not, however, exhibit an equal respect for the princely virtue of punctuality. He did not make his appearance until nine o'clock, when, despairing of the Emperor's coming, the evening's proceedings had been commenced by the reading of a paper commemorative of the lately deceased Milanese traveller, Enrico Besana.

Signor Adamoli dwelt upon the immense services to modern science and commerce rendered by the laborious life of research led by Besana,—the story of which should serve as a powerful stimulus to the youth of Italy to complete the work he had initiated.

After stating the various donations lately received by the Library, the President thanked the Emperor for the honour of his visit to their Society, and took up the subject of Signor Adamoli's discourse. He offered ample testimony to Besana's merits as a patriot and an explorer, and explained that if his fame were not already widely spread, this was solely attributable to the retiring modesty of the man himself, who had ever shrunk from notoriety and remuneration.

The Society, now entering upon its eleventh year of existence, has 2200 Associates, 120 of whom are life-subscribers. The interest shown in the African Exploring Expedition, and in the late journey round the world, and the works last published by the Society, evidenced, said Signor Correnti, the rapid increase of geographical studies in Italy.

After defending their Society from the accusation of lukewarmness and indifference, the President explained the motive for establishing a station at Ankober, as proposed by the Brussels International Congress; and announced the constitution of an Italian Committee, presided over by Prince Humbert.

Signor Correnti stated that the departure of the second Expedition into Central Africa was fixed for the 6th March, and that Captain Martini would be conveyed to Zeila by an Italian man-of-war.

March 11th, 1877.—At the Conference held this day by the Italian Geographical Society, the members and visitors received with every token of due sympathy and respect the brave Italian traveller, Signor Romolo Gessi, the latest explorer of the Lake Albert Nyanza. The Society's rooms were crowded, even more than usual, by persons of note in science, literature, and politics.

The President opened the proceedings by stating the result of the Society's efforts respecting the first and second exploring expedition into Africa, and how the latter had just gone out under the special protection of the King and Government, assisted further by contributions from the entire nation. Signor Correnti pointed out the important scientific questions this expedition might be expected to solve satisfactorily.

He then passed a fervent eulogium on Signor Gessi, General Gordon's lieutenant, and indicating by a gesture General Türr (who was present at the meeting, and spoke later on of the vast undertaking regarding the Isthmus of Panama), the President said:—"Here we have another enterprising and indefatigable Italian—I may well style him such, with your permission, since he bore with pride, even in his own glorious land, the name and affection for a country, his not simply by adoption, but even historically.

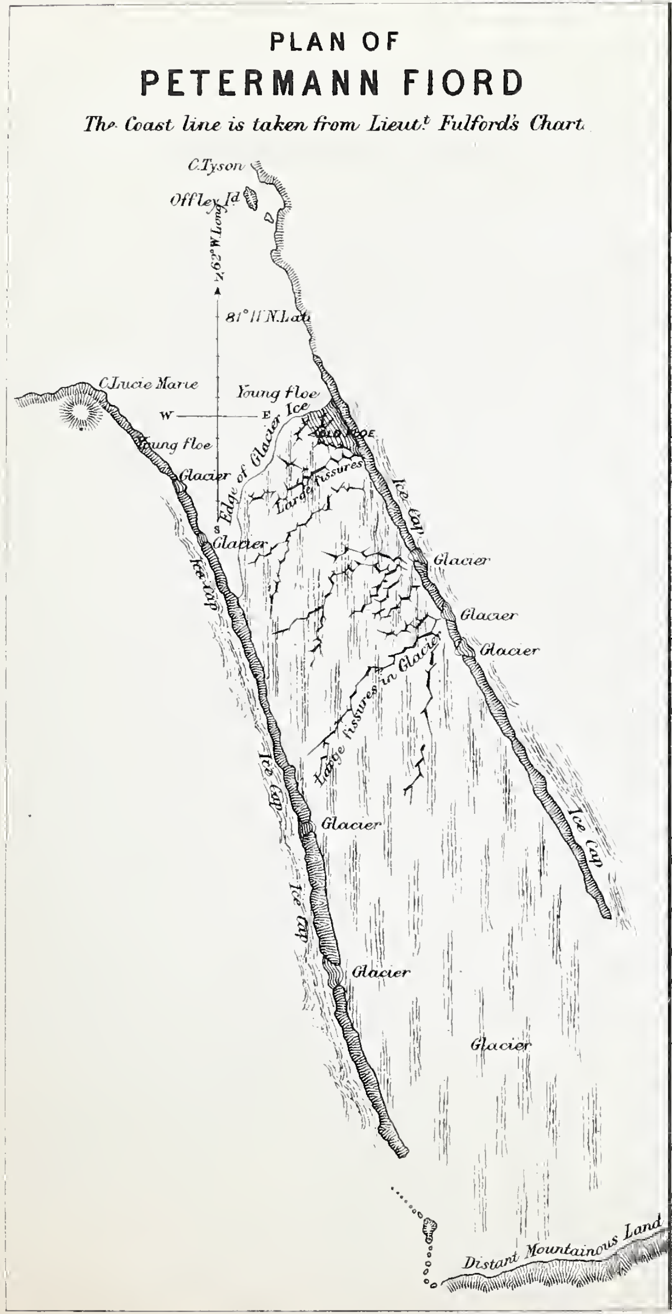
Comm. Correnti next summoned a general meeting of the members for the 25th March, adding that this had been delayed in consequence of the labours involved by the preparations for the second expedition into Africa.

Signor Gessi himself then addressed the assembly, spoke at length of his journey to the Albert Nyanza, and spoke in terms of the warmest admiration of Gordon, his illustrious general. He concluded his interesting discourse by sending brotherly greeting to the Italian Expedition into Central Africa, promising to do all in his power to meet the party in the regions to the east of the Victoria Nyanza.

NOTICE.

The Office of The Geographical Magazine *is at* 57 & 59, *Ludgate Hill, E.C.*

Annual Subscription and Postage, £1, *Inland. Foreign Orders must be accompanied by P.O.O. or Cheques to include the full amount of Foreign Postage. Post Office Orders to be made payable to Messrs. Trübner & Co.*, 57 & 59, *Ludgate Hill, London, E.C.*



PLAN OF
PETERMANN FIORD

The Coast line is taken from Lieut.t Fulford's Chart.

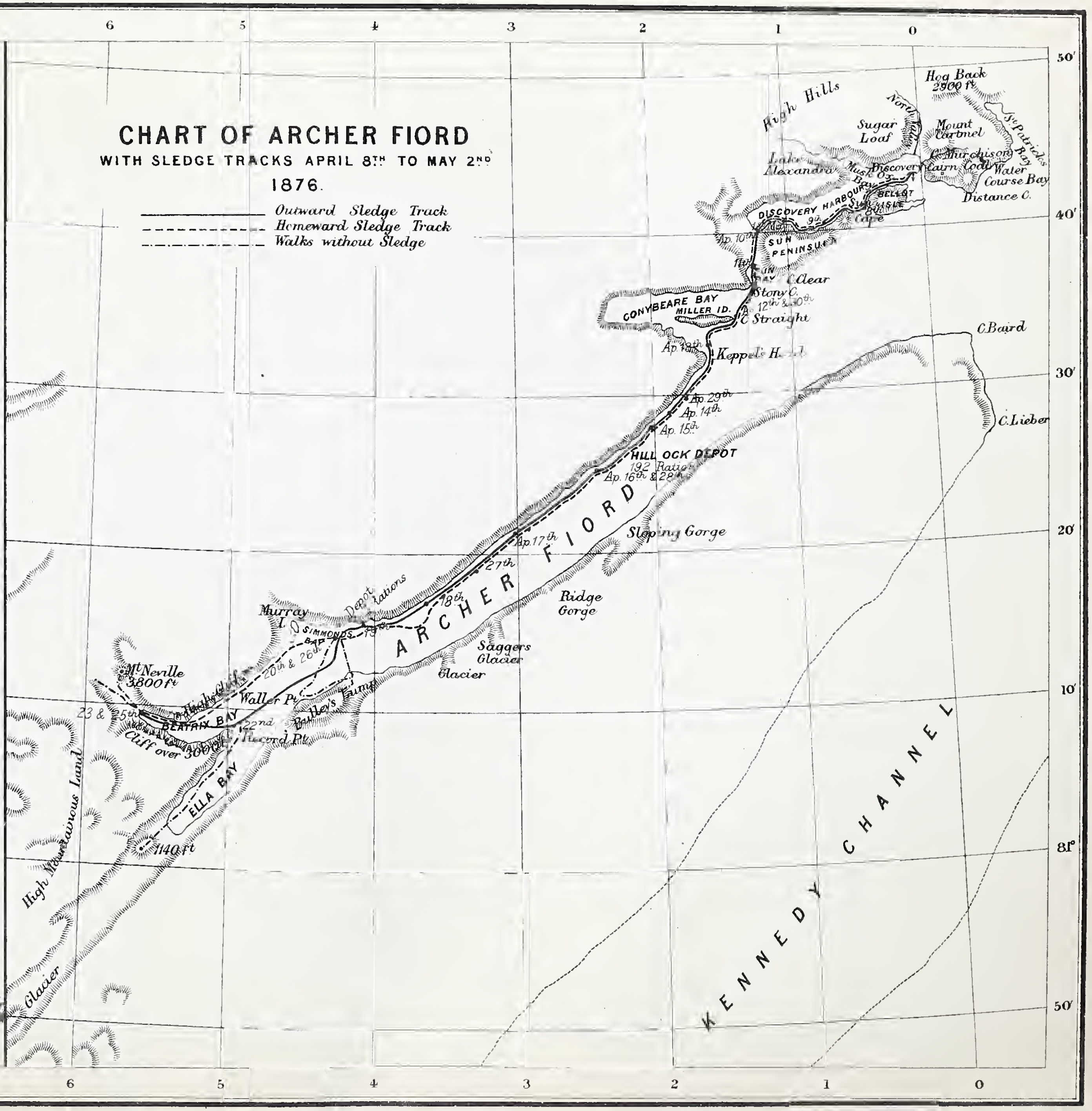


CHART OF ARCHER FIORD
WITH SLEDGE TRACKS APRIL 8TH TO MAY 2ND
1876.

THE

GEOGRAPHICAL MAGAZINE.

JULY, 1877.

THE ARCTIC EXPEDITION.

XVI.

Work of the Auxiliary Sledge Parties.

(*Second Part.*)

In our last number we gave some account of the admirable work performed by the auxiliary sledge parties of the 'Alert.' It remains to place on record, in these columns, the similar arduous and useful services of the officers and men of the 'Discovery.'

Egerton and Rawson arrived at Discovery Bay, and thus opened communication between the two ships, on the 24th of March 1876. The whole scheme of spring exploration was then arranged. The main extended party, commanded by Lieutenant Beaumont, with Lieutenant Rawson and Dr. Coppinger in charge of supports, which was to explore the north coast of Greenland, left the 'Discovery' for the 'Alert' on the 6th of April; and some account of the terrible sufferings and heroic conduct of both officers and men will be found in our numbers for December 1876, p. 320, and April 1877, p. 86. The base of operations for this important enterprise, under the lead of Beaumont, was to be the depôt left by the Americans at Polaris Bay, on the opposite shore of Robeson Channel; and Captain Stephenson, therefore, despatched an auxiliary party under Lieutenant Archer, accompanied by Dr. Coppinger, to make a complete inventory of all that was to be found at Polaris Bay.

On the 28th of March, Lieutenant Archer set out with a dog sledge and twelve dogs, his party consisting of Dr. Coppinger, Thomas Simmonds (a first-class petty officer), Daniel Girard (an able seaman), and Hans, the Eskimo, who had been in the expeditions of Kane, Hayes, and Hall. They crossed Robeson Channel in twenty-five hours, including a night's halt, arriving at "Hall's Rest," in Polaris Bay, in the forenoon of the 30th. The distance, as the crow flies, is 28 miles and the ice was very heavy near the shore. The temperature was as low as — 40. After examining the observatory and the grave of Captain Hall, and holding a careful survey on the provisions at the depôt, Lieutenant Archer started again on the 2nd of April, and reached the 'Discovery' on the 3rd, at 9 A.M., the whole journey occupying eighteen hours.

The next work of the 'Discovery' was the exploration of Lady Franklin Inlet, which was believed to be a strait possibly leading to the Palæocrystic Sea. This required the organisation of an extended party, which was placed under the command of Lieutenant Archer. He had a twelve-man sledge, called the 'Westward Ho,' victualled for fifty days, and was supported by Sub-Lieutenant Conybeare, with the eight-man sledge 'Endeavour,' victualled for forty-two days; Conybeare accompanying the extended party for seven journeys, then completing the provisions on Archer's sledge, and leaving a depôt of seven days for the return journey. Captain Stephenson himself, with H.M. dog sledge 'Sir Leopold,' accompanied by Mr. Miller, the Engineer, went with the party during the first week, and saw the explorers well on their way. The names of the crews of H.M. sledges 'Westward Ho' and 'Endeavour' will be found facing p. 314 of our number for December 1876.

The party started at about noon on the 8th of April, Captain Stephenson and Lieutenant Archer going on in front in the dog sledge, as pioneers. On the 12th they reached Cape Straight, which proved to be on an island (afterwards named Miller Island) at the mouth of a large opening called Conybeare Bay. On the 14th they were at Keppel's Head, at the southern end of the bay, and here Captain Stephenson and Mr. Miller took leave of the explorers and returned to the ship. Owing to an accident to the twelve-man sledge, Lieutenant Archer took command of the smaller eight-man sledge, transferring the larger one to Conybeare, who deposited a depôt of 192 rations, and then returned to the ship on the 20th of April.

Archer continued his journey along the western shore of the inlet, which trended in a direct line about south-west. On the 19th he halted opposite to a remarkable hill on the opposite shore, named "Bulley's Lump," after one of the men, and made an unsuccessful attempt to climb to the summit. He reached Record Point on the 20th, where the inlet terminates in two bays named Ella and Beatrix. On the 21st he went up Ella Bay, and ascended a ridge 1200 feet high, but obtained a very limited view, as the surrounding hills are of great height. Next day he took the sledge up Beatrix Bay to the westward, and on the 25th succeeded in reaching the summit of a hill named Mount Neville, a height of 3800 feet above the sea. Towards the north he observed a range of mountains, with glaciers, at a distance of about 20 miles, and far away to the south peaks were visible which he estimated at 5000 feet above the sea. He judged, from the trend of the mountains, that any coast line beyond them could not have a direction to the southward of S.W. Archer commenced his return journey on the 27th, and arrived on board on the 2nd of May, after an absence of twenty-four days. He found Lady Franklin Inlet to be an opening 9 miles broad at the mouth, leading to a deep, narrow bay, 65 miles long, which has since been named Archer Fiord. At a distance of 20 miles from the entrance it separates into two arms, Conybeare Bay, which is only 10 miles deep on the west, and Archer Fiord, between 4 and 5 miles wide, and forty miles long from Keppel's Head to Record Point. Here it divides into Ella and Beatrix Bays, where the fiord terminates. For the whole length it is bordered by precipitous cliffs, which are of great height at the further end, in one place over 3000 feet sheer. Much of the heavy polar ice is met with until within a few miles of the head of the fiord. The party had no lime-juice, and had no scurvy, which is one more proof of the monstrous absurdity of the conclusion arrived at by the Arctic Scurvy Committee. The termination of the fiord was of course a great disappointment to Lieutenant Archer and his party, as they were equipped for an extended journey; but at the same time this zealous officer completed very thoroughly an important piece of geographical work.

Captain Stephenson, accompanied by Mr. Mitchell, the Assistant Paymaster, left the 'Discovery' in a dog sledge on the 18th of April, and arrived on board the 'Alert' on the 23rd. After having discussed all necessary points with Captain Nares, and received his final instructions, Captain Stephenson set out for the 'Discovery' again on the 30th, and got back by the 4th of May, a very rapid journey, especially as he was confined to his tent for one day by a gale of wind.

On the evening of the 2nd of May, Sub-Lieutenant Conybeare had been despatched to Polaris Bay with the 15-foot ice-boat, to enable Beaumont's party to cross the channel on their return, late in the summer. He came back on the 6th, and on the following day Lieutenant Fulford and Sub-Lieutenant Conybeare set out again for Polaris Bay, with the 20-foot ice-boat. They were followed by Captain Stephenson himself, in the dog sledge, accompanied by Mr. Hart, the Naturalist, and the whole party reached Polaris Bay at the same time, on the 12th of May. There were some large floes of young smooth ice in the channel, but lines of hummocks and heavy nips along both sides, the heaviest being on the eastern shore, with some large grounded bergs. The party at Polaris Bay now consisted of the Captain, two officers, the Naturalist, twenty men, and eight dogs. On the 13th of May, Captain Stephenson hoisted the American flag over Captain Hall's grave, and erected a brass tablet at the foot, which had been brought out from England for the purpose. On the 15th, Dr. Coppinger, with nine men and two sledges, arrived from Repulse Bay, having left Beaumont and Rawson at Cape Stanton, on the 3rd. Fulford and Coppinger then took a depôt of eight days' provisions across the neck of land, 10 miles wide, and placed it on the south shore of Newman Bay, in anticipation of the return journey of Beaumont's party. Captain Stephenson ordered them to lay out this depôt, then to explore Petermann Fiord, and to return to Polaris Bay by the 15th June, so as to meet Lieutenants Beaumont and Rawson. Fulford and Coppinger had with them two men and eight dogs.

On the 17th of May, the Captain, with Conybeare and Hart, and a party of twenty-seven men, set out on their return, arriving on board the 'Discovery' next day, a journey of 27 miles, performed in seventeen marching hours. This was a splendid day's work, as also was the journey of Archer and Conybeare in March. They show that seamen, when the circumstances are equally favourable, can hold their own with the best *voyageurs* in the Hudson's Bay Company's service. On the 22nd of May, Mr. Conybeare was sent to the 'Alert' with despatches, having with him four men (Girard, Hitchcock, Thornback, and Chalkley) and H.M. sledge 'Endeavour.' In this journey Chalkley was attacked by scurvy. Mr. Conybeare was obliged to remain on board the 'Alert' with his sledge crew, owing to the dangerous state of the ice in Robeson Channel. He formed one of the sledge crew which went out to succour Captain Markham's party, and was afterwards away with Captain Markham on a shooting excursion for a fortnight. Altogether he had fifty-two days of sledge travelling.

On the 24th of May, Captain Stephenson and Lieutenant Archer went away with a dog sledge and ten days' provisions, to explore a portion of the coast to the northward of the 'Discovery's' position, returning on the 2nd of June. Mr. Hart (the Naturalist) and Mr. Cartmel (the Engineer) went on an exploring excursion to the head of St. Patrick's Bay from the 5th to the 13th of June; and again from the 23rd of June to the 1st of July to Alexandra Lake, at the head of Musk Ox Bay, with a view to shooting and exploring the neighbourhood.

In obedience to orders received from Captain Stephenson at Polaris Bay, Lieutenant Fulford, after having established the depôt at the south end of Newman Bay, started for the exploration of Petermann Fiord on the 22nd of May. His sledge was named the 'Faith,' after his kinswoman who married John Davis, the great Arctic Navigator, in the days of Queen Elizabeth. He was accompanied by Dr. Coppinger, and had with him Frank Chatel (a first-class petty officer), Hans (the Eskimo), and eight dogs. Chatel was attacked with scurvy, in spite of large allowances of lime-juice, one more proof of the fallacy of the Scurvy Committee's theory.

The travelling was good, and Fulford was able to make a straight course from Hall's Rest to Cape Tyson, a distance of 20 miles, and, passing between it and Offley Island, he reached the margin of an ice barrier up Petermann Fiord at a distance of 13½ miles from the entrance. Here they encamped, but owing to the fissures and water cracks they were unable to penetrate more than 6 miles beyond this point, or 18½ miles from Offley Island. The narrative, by Dr. Coppinger, of the examination of Petermann Fiord and its very peculiar glacier, by himself and Lieutenant Fulford, is of such special geographical interest that we give it in that accomplished officer's own words:—

"On leaving Cape Tyson and Offley Island, which were considered to mark the north-east side of the mouth of the fiord, we saw, some miles before us, an abrupt, precipitous wall of ice, extending in an irregularly wavy but unbroken line from shore to shore. When we had got about 10 miles S.S.E. of Offley Island, the young floe on which we had been travelling terminated, and was connected through the intervention of a hummock hedge with an old glassy-hummocked floe, over which we proceeded until we reached the margin of the heavy ice above mentioned.

"Here, at 11½ miles S.S.E. of Offley Island, and about 1000 yards from the high precipitous cliffs which form the N.E. shore of the fiord, we made our second camp. The old floe on which we camped was rigidly connected with the heavy ice; in some places the precipitous and cleanly-fractured face of the latter meeting the old floe at a sharp right angle. On examining the surface of the heavy ice, we found it to be totally different in character from that of a floe. It was of glassy smoothness, and so slippery and uneven that walking (in the ordinary sense of the word) was impossible, and to get along at all it was frequently necessary to resort to crawling. The surface was thickly studded with circular pits, about 6 inches deep, and from 1 to 18 inches in diameter, usually containing a little snow and some dark powder, of which I obtained specimens. In general configuration the surface of this ice was arranged for the most part in undulating ridges, extending obliquely down the fiord in a north and south direction, but, as a rule, interrupted by wide fissures and faults, so that few of the ridges were directly continuous for a greater length than 2 miles. The height from crest to furrow was usually about 30 feet, and the slope so steep and slippery that in many places it was quite impracticable to cross the ridges except by cutting steps, or some such contrivance. The furrows, as a rule, had a certain amount of snow bed, and so far as they went, afforded good travelling; but when the ice was devoid of snow, not even a dog could obtain foothold. It is not to be understood from the above that the ice-surface was everywhere disposed in these great ridges and furrows; for there were many patches from 5 to 6 acres in extent of bare ice exhibiting an irregularly undulating surface, from 30 to 35 feet above the water level, and intersected by narrow fissures.

"Having explored all the ice within a day's journey of this camp, and found that by keeping for three-quarters of a mile to the old *floe*, which sent a tongue under the N.E. cliffs, and taking to a furrow of the glacier ice for another three-quarters of a mile, we could advance our position, we packed up and proceeded.

"Our third camp, then, reached on the 25th May, was 13 miles from Offley Island and 200 yards from the N.E. line of cliffs. From 4 miles to the northward of this position, these cliffs presented a vertical face about 1100 feet high, composed of alternating bands of light grey and dark slate-coloured fossiliferous limestone rock, and, from abreast our third camp, were surmounted by an ice-cap, whose blue, jagged edge lying flush with the face of cliffs we estimated at a thickness of 40 feet. The cliffs of the S.W. shore of the fiord presented a similar ice-cap, but of greater extent, as it began about 10 miles to the southward of Cape Lucie Marie—*i.e.* on the south side of the first glacier—and was continuous to the southward as far as the cliffs were seen to extend.

"From both sides the ice seemed to be flowing steadily over the cliffs, as evidenced by frequent avalanches in which great masses of the ice-cap projecting over the cliffs became detached, and carrying with them in their descent masses of rock torn from the face of the cliffs, came thundering down to the floe, marking their flight by dense clouds of snow, and accompanied by a long series of echoes, creating a grand and imposing spectacle. Some idea of the force with which these avalanches came down may be gathered from the fact that large stones were sometimes projected on to the floe to a distance of 80 yards from the foot of the cliffs.

"At this third camp we spent three days devoted to walking excursions. The greatest distance up the fiord to which we could proceed was 6 miles from camp, and to attain this distance we had to run some risks of falling through hidden crevasses, and slipping from high ice slopes into water-chasms; so that we had to content ourselves with making our furthest look-out point on the summit of an ice-pinnacle 18½ miles from Offley Island.

"About 1 mile from us was the nearest glacier of the N.E. shore, two miles beyond it a second, and half a mile further on a third. We had found, as we approached these glaciers, that the main ice of the fiord became more and more fissured, and that the faults in the continuity of the ridges and the furrows were more frequent and embarrassing; but from the eminence now attained it seemed that these glaciers were the nuclei of disruptions of the main ice, and hence the progressively-increasing difficulties of travelling. Carrying the eye along the N.E. line of cliffs, we saw the land terminate abruptly about 20 miles off in a prominent bluff, and from this point to a quarter of the way across the head of the fiord no land was to be seen, but the same extraordinary undulating sea of ice, which, from the main ridges lying in a north and south direction, would seem to be flowing into the fiord in an east to west direction. The fact of our distinctly seeing those ridges at so great a distance was perhaps due to the gradual shoaling of the water up the fiord, and the consequent rise in the elevation of the ice.

"Carrying the eye to the right of a bearing of N. 120° (mag.) from our furthest position, a background of land about 30 miles distant was clearly seen extending behind, and, as it were, overlapping the apparent termination of the S.W. line of cliffs. The latter cliffs presented to the eye an appearance almost precisely similar to that of the N.E. cliffs, and they seemed to correspond as if originally parts of the same land. Both were of about equal height, were equally precipitous, presented the same arrangement of strata, the same description of ice-cap; and both were grooved by glaciers, there being four on the S.W. side and three on the N.E. side of the fiord.

"When about a mile from the nearest glacier we came to a wide fissure, about 30 yards broad, which seemed to extend nearly across the fiord, and whose precipitous glassy walls, 50 feet high from brink to water, we had no means of descending. The bottom of this fissure was composed of treacherous-looking, slushy ice, with a lane of dark water, 2 feet wide, along the middle; so that had we succeeded in getting down, we should probably have been unable to cross. About this same locality were several narrow fissures, some of which, from the very slippery nature of the ice, it was difficult to avoid falling into. One of these, in a tolerably level part of the ice, we found by measurement to be 2 feet wide above, and

23 feet deep, from brink to a probable false bottom of loose snow, on which the light weight of our measuring line rested.

"The ice seemed to be incessantly cracking. Wherever we stood we heard about every half minute a noise varying between the sharp crack of a whip and the report of a guncap, resulting, as we soon discovered, from the formation of thread-like cracks, many yards in length, which formed a kind of network over the surface of the ice.

"The behaviour of the water in the wide fissures was very puzzling. It seemed to rise and fall to a certain extent through the ice, but not enough to account for the whole tidal movement; and we were therefore inclined to believe that the glacier ice was only aground at certain periods of the tide, and that it consequently behaved, in some respects, like a floe, and in others like grounded ice. Not being provided with a sounding line, no estimate of the depth of any part of the fiord was made. However, to solve the question as to the existence of a vertical tidal movement in the ice, Lieutenant Fulford took a series of sextant angles between the summit of the cliff adjoining our camp and a marked spot on the ice, and observing at different periods of the tide, came to the conclusion that there was a certain amount of vertical motion.

"Having failed to get up the fiord by the N.E. side to a greater distance than 18½ miles from Offley Island, Lieutenant Fulford decided on moving round by the edge of the glacier ice to the opposite or S.W. side, and on trying there to discover a more practicable route than we had hitherto encountered. In the latter attempt, however, we were disappointed, for after travelling along the floe under the S.W. cliffs to a distance of 13 miles from Cape Lucie Marie, we found the glacier ice jammed right against the face of the cliffs, and not affording anywhere a practicable route for our sledge. Between the young floe and the glacier ice was a well-marked tidal crack, which extended for three-fourths of the way across the fiord, that is, as far as the young floe and the glacier ice met without the intervention of an old floe.

"On the 3rd June we commenced our return journey; and, stopping for one day at Offley Island, had opportunities of collecting specimens of Silurian fossils, and of observing the glacial planings and scorings which this island exhibits to a remarkable degree. The scorings run uniformly from the summit of the island, at its N.E. extremity to the beach at the S.W. end, grooving successive layers of grey and black limestone. These layers of rock lie horizontally; both are fossiliferous, the grey abounding in fossil corals and molluscs, the black containing corals, but to a less extent. The N.E. extremity presents an abrupt precipitous face, 513 feet high, showing the same arrangement of stratified rock as on the glaciated slope, and closely corresponding with the appearance presented by the opposite face of Cape Tyson, 1 mile distant. Subsequent observations at Cape Tyson showed that in geological formation it corresponded with Offley Island.

"In several particulars the Petermann Fiord glacier presented features deviating considerably from the general rule, which, although already touched on in this report, it may be as well to summarise as follows:—1. The absence of onward sliding motion, probably due to the immobility of the floe in the mouth of the fiord, the low gradient of the glacier, and the prolonged cold season. 2. Its partial subjection to tidal influence for more than a mile above the snout. 3. The absence of detached bergs below the snout. 4. The diminutive height of the terminal cliff, ranging from 16 to 30 feet above the sea level. 5. The presence of water in the fissures 2 miles above the snout, when the mean altitude was 40 feet. 6. The low gradient of the glacier."

On the 7th of June, Fulford's party returned to Polaris Bay, where he found Lieutenant Rawson, who had parted from Lieutenant Beaumont on the 11th of May with orders to bring back a man named Hand, who was suffering from scurvy. Hand walked by the drag ropes, being too ill to pull, the crew consisting of Bryant, Regan, and Elijah Rayner, a gunner of Marine Artillery. This man, Rayner, seems to have had more travelling than any man in the Expedition, namely fourteen days in the autumn with Lieutenant Rawson, fourteen with one of the 'Alert's' depôt parties, and 117 with Lieutenant Beaumont—in all 145 days. Bryant and Regan had very nearly as much. Rayner, the Gunner, is a Norfolk man, then aged twenty-eight. They reached Polaris Bay on the 3rd of June, poor Hand having been carried on the sledge since May 31st, and he died six hours after his arrival at the depôt. Bryant and Regan were also suffering from the same disease.

On the 22nd Rawson determined to meet Beaumont's party with the dog sledge, taking with him Dr. Coppinger, Hans, the Eskimo, eight dogs, and sixteen days' provisions. On the 25th they met Beaumont in Newman Bay, with all his party suffering from scurvy. Lieutenant Beaumont, Alexander Gray (Ice-Quartermaster), and Frank Jones (Stoker) were alone able to drag, the others having to be carried on the sledge, namely, Paul, Jenkins, Craig, and Dobings. On the 28th, Dr. Coppinger took Paul and Jenkins on the dog sledge, and brought them straight to Polaris Bay, but Paul died on the 29th of June, seventeen hours after his arrival. On the 1st of July the whole party arrived, and the others soon began to recover under the watchful care of Dr. Coppinger. Their restoration to health was not, however, due to the lime-juice but to the fresh seal meat, the complete rest, and kindly nursing. On the 12th of July, Lieutenant Fulford, with the dog sledge and two men, Chatel and Regan, proceeded across Robeson Channel to convey the news of the safety of the survivors of Lieutenant Beaumont's party to Captain Stephenson. He found the young ice most treacherous, his people were constantly wet, and Regan fell through. The passage across had, indeed, become very dangerous without a boat, for the pack was in motion, and it was providential that Fulford and his party succeeded in reaching the 'Discovery' without serious accident on July 15th. There is no other instance of any one having crossed such a channel without a boat, so late in the season, over a moving pack.

On the following day Captain Stephenson started for Polaris Bay with an eight-man sledge and six men, a dingey, and medical comforts for the sick. He arrived on the 19th, and remained at the encampment for ten days, during which time the sick made satisfactory progress. Hans, the Eskimo, had been indefatigable in procuring game, and 10 seals, 1 musk ox, 36 Brent geese, and a hare were obtained before the Captain left them. He arranged that Lieutenant Beaumont, Dr. Coppinger, two marines and the five sick men should remain until the 5th of August, and on the 29th of July he returned with Lieutenant Rawson, arriving on board the 'Discovery' on the 3rd of August.

On the 21st of July, Mr. Hart (the Naturalist) reported the existence of coal in a ravine in Water Course Bay, the seam extending for a distance of about 250 yards by about 25 feet broad above the bed of the water-course, and extending beneath it. Mr. Cartmel blasted some portion of the seam to a depth of 5 feet 6 inches from the surface, and some 60 lbs. of coal were obtained, quite equal to Welsh coal, almost smokeless, and burning to a very small quantity of white ash.* On the 28th of July the whole of the winter's ice disappeared from Discovery Harbour. On the 1st of August, Lieutenant Archer and Mr. Hart hauled the seine in Alexandra Lake, and caught several salmonoids, which were preserved as specimens. On the 6th, Mr. Egerton arrived overland, with news that the 'Alert' was approaching, and in the same evening Lieut. Rawson set out for the 'Alert,' with news of the absence of Beaumont's party in Polaris Bay. He returned on the 8th, and on the way he performed a remarkable feat. At the head of St. Patrick's Bay he came upon a musk ox, but he had no gun. He, therefore, fastened a knife to his alpenstock, induced the animal to charge him by throwing stones, and at length succeeded in killing it. On the 9th, Rawson and Egerton, with three men, went again to St. Patrick's Bay, to look out for Lieutenant Beaumont's party.

In the evening of the 8th of August, Beaumont and Coppinger left Polaris Bay with the 15-feet ice-boat, and the sledge towing astern. Sometimes they dragged the boat across a floe on the sledge; at others they launched the boat to cross a lane of water, towing the sledge after them, being drifted to the south all the time. By the 11th they were south of Cape Lieber, the ice breaking up all round them. The change from sledging to boating was frequent and hurried, and the position was becoming very critical. At length they reached the western land between Capes Lieber and Baird on the 12th of August, the men dead beat. Next day they started again, worked hard for twenty-two hours of dragging, and then encamped. They were just preparing to start again, when they heard a cheer, and found that Captain Markham had come to the rescue from the 'Alert.' After a warm welcome on board that ship, they reached the 'Discovery' on the 15th of August 1876.

Thus ended the sledge travelling of the 'Discovery,' officers and men having worked hard and continuously since the end of March, a period of fully four months, during which time they had nobly performed their share of the great and glorious work of Arctic discovery. Besides keeping up communications, laying out depôts, and bringing succour, the auxiliary parties of the 'Discovery' explored Archer Fiord, carefully examined the Petermann Fiord, and discovered the important coal seam in Water Course Bay. Like their comrades of the 'Alert,' they were indefatigable, intrepid, untiring, and consequently successful.

Captain Stephenson himself was away 52 days, during 37 of which he was actually travelling. Beaumont was away 127 days, during 88 of which he was actually travelling; Coppinger 133, Rawson 139, Archer 41, Fulford 69, and Conybeare 52 days. Including the 'Alert' trips of May and Egerton, Robeson Channel was crossed no less than twenty-eight times, by different travelling parties. In fact, they were incessantly at work during the whole sledging season.

Actual distances depend entirely on the character of the ice, and nothing can be more unfair and misleading than to adopt them as a standard of comparison. It may, on the contrary, be safely assumed in Arctic travelling that long marches are another word for easy work, and that short distances betoken the most gallant and persevering struggles against almost insurmountable difficulties. In Arctic sledge travelling the true tests of good work are the dates of starting, and the number of days of absence. Judged by these tests the Arctic Expedition of 1875-76, both as regards its autumn and its spring travelling, stands in the very first rank. The average absence of its extended parties was ninety-three days, of its auxiliary parties forty-five days, and of all its parties fifty-six days.

A careful examination of the sledging journeys of 1875-76 proves that every detail was attended to; that all the arrangements were ably and judiciously made; that each separate journey formed a necessary part of one harmonious plan directed, with great skill, towards securing the objects of the Expedition; and that the work, so admirably conceived by Captain Nares, was, in the face of unparalleled difficulties and sufferings, most gallantly executed by the officers and men under his command.

THE SCURVY REPORT.

II.

It will be our duty to return to the subject of the Scurvy Committee's Report on other occasions, because, in the interests, not only of truth and fairness, but of the advancement of geographical knowledge, which it will very injuriously affect if its fallacies are not thoroughly exposed, it must not be allowed to remain unchallenged. On the present occasion we reprint a letter written by Sir Leopold McClintock on the subject, as well as the remarks of Mr. George Murray, an old Arctic petty officer, who served in three expeditions.

Geographers, throughout the world, will accept the following generous letter written by Sir Leopold McClintock, the greatest of living Arctic authorities, as outweighing all the censures of all the Boards of Admiralty and Committees that ever sacrificed justice to supposed expediency. It was published in the *Army and Navy Gazette* for June 2nd, 1877:—

"Sir,—Will you kindly allow me through the medium of your paper to make known one or two facts bearing upon the health of the Arctic sledging crews and the recent enquiry respecting the outbreak of scurvy in the Arctic Expedition, as I think it due to Sir George Nares and his officers that former Arctic experience should not be lost sight of? If Sir G. Nares erred in not having supplied his sledge parties with lime-juice, then we Arctic travellers have all likewise erred. I have myself made several sledging journeys, varying in length from twenty to one hundred and five days each, without either lime-juice or scurvy in any of my parties; and the experience of my brother officers in the Franklin search agreed with my own. Briefly, we lived upon pemmican, and enjoyed sound health. Therefore, acting as I have always done upon experience, when obtainable, in preference to any number of suggestions, however valuable they may appear, had I been in Sir George Nares' place I also would have left the lime-juice behind.—I am, &c., Leopold McClintock."

---

* See also our number for January 1877, p. 2.

The editor adds the following remark:—

"This is a very remarkable and decisive expression of opinion, and coming after the Report of the Committee, which contained what was nothing more or less than an emphatic condemnation of the course Admiral McClintock declares he would have pursued, may cause those who assailed Sir G. Nares so vigorously to reflect a little, and to see that there are two sides to the question."

We are glad to be able to add the following remarks from another authority. Mr. George Murray, who is now entering upon an honoured old age, after a long and useful career, has been at sea since his boyhood, and has served for many years both in the royal and the mercantile navies. He was in the Arctic Expedition of 1848-49, under Sir James Ross, and was a Quartermaster in the subsequent expeditions of 1850-51, under Sir Horatio Austin, and of 1852-54, under Sir Henry Kellett. He served with McClure, McClintock, Osborn, and Hamilton; and was in the extended sledging parties in all three expeditions. Those who have served with George Murray know him as a shrewd and accurate observer, and as a man of no mean literary attainments. He says:—

"You do me the honour to ask my opinion on the lime-juice question, I shall give it you in a few words. Notwithstanding that I attach considerable value to lime-juice as an anti-scorbutic, I deny that it has anything like a specific remedial action on the disease. The allegation made and tenaciously adhered to by some in 'high places,' that the sole cause of the outbreak of scurvy in the late Arctic Expedition was the absence of lime-juice from the sledge diet, is to me a proposition so absurd, so opposed to reason and experience, that I deem it unworthy of a moment's consideration. My belief is—and I think there can be no question about it—that the disease was engendered in the men's systems during the winter, the time when they were drinking regularly their daily allowance of lime-juice. So much for the 'precious cordial' as a preventative. The spring came (the most favourable season for the development of scurvy), the sledge parties started on their several journeys, and they were scarcely out of sight of the ships when the debilitating influence of the disease became apparent. Lime-juice had not proved a preventative during the winter, and no amount of it then would have effected a cure so *efficaciously* as to enable the men to undergo the fatigues and privations of a Polar journey. The question, 'How did scurvy originate—what where its exciting causes in an expedition said to be so magnificently "found"?' is one that will never be answered to the satisfaction of everybody. My own reply is, the long absence of the sun, the unprecedented low temperature, and not being able to procure any genuine fresh meat, such as game, &c.

"During my long career at sea in the mercantile and royal navies in all parts of the globe, I have seen much of scurvy, and some deaths from it, and I reiterate that lime-juice has nothing like a specific remedial action on it.

"It has been alleged by some wise folks that the officers of the late Expedition escaped scurvy through not being so hard worked as the men. No allegation could be more false. What, I ask, would have become of the sledging parties but for the indomitable pluck of these officers? They would have perished.

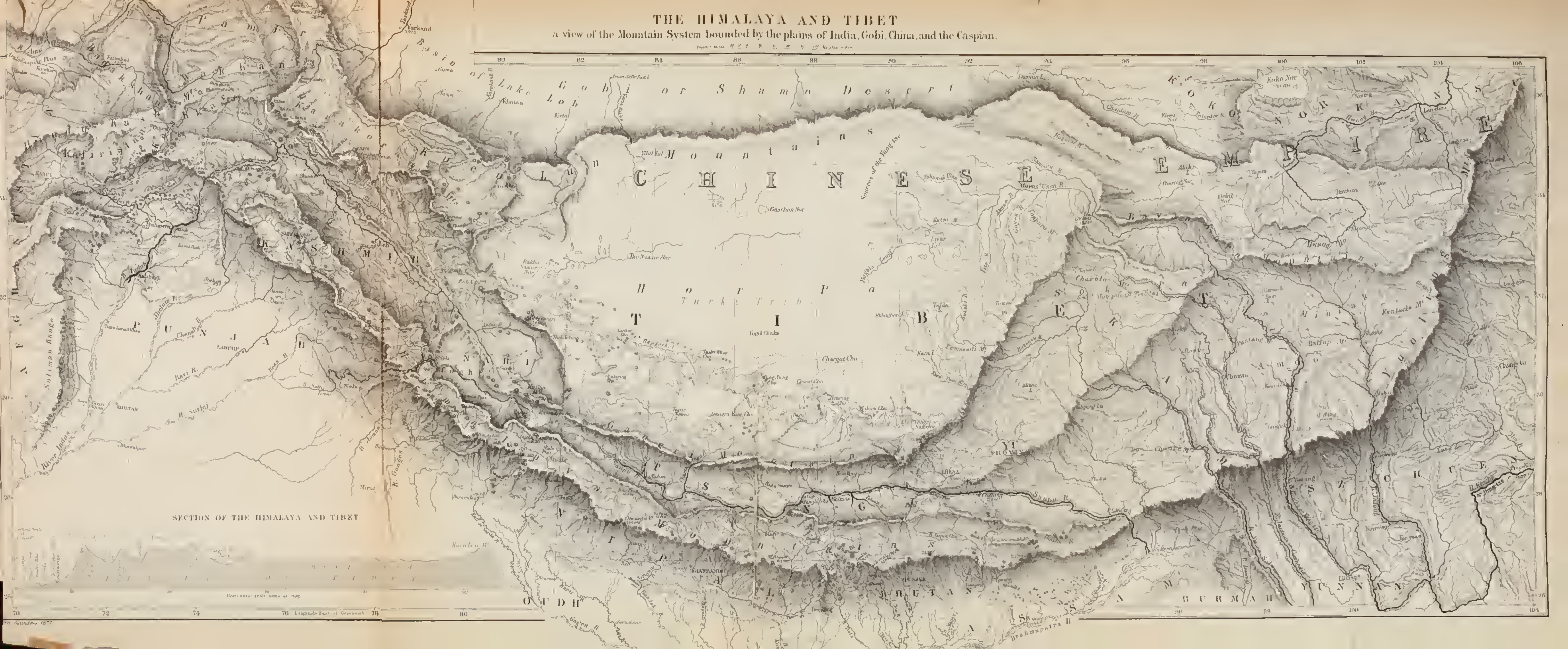
"Experience has long since told me that the higher the intelligence, the greater the physical endurance. The organ which phrenologists call *Love of approbation* appears to develop with education. To an educated man of high spirit failure in a great enterprise is death. The saying attributed to the Duke of Wellington, 'What will they say in England?' is ever on his lips. This leads me to remark, that if ever the North Pole is reached by sledges, those sledges will be manned with officers.

"I should be sorry to see the reputation of Sir G. Nares sacrificed to a mere medical dogma, a dogma in the worst sense of the word, as being not only assertion without proof, but an assertion opposed to experience.

"In my first voyage in search of Franklin, under Sir J. Ross, the provisions were wretchedly bad, the salt meat frequently boiling away to half its original weight. The preserved fresh meats were so bad that they became the subject of an inquiry on the expedition's arrival in England. Sir James was not fortunate in his crew; he was a big man himself, and he was fond of big men, and on travelling with him the big men all broke down. His travelling allowances were 1 lb. meat, 1 lb. of biscuit, rum, chocolate, and lime-juice. He did not start before the middle of May. Out-door exercise all day; building snow-house and snow-walls. He had no pemmican.

"In the two following expeditions the provisions were of the *very* best quality, and the allowance most ample. The travelling allowance for the extended parties was—pemmican 1 lb., pork 6 oz., $\frac{3}{4}$ lb. biscuit, bread-dust to mix with the pemmican, rum, tea, and chocolate. None of the extended parties of either of the two expeditions carried lime-juice.

"The outdoor exercise in either of the expeditions could scarcely be said to be compulsory until the spring, when the men were compelled to take long walks every day to inure them to travelling. In the second winter, under Kellett, discipline became rather lax, every man doing as he liked with regard to exercise. Still, all were healthy, and in the spring, on abandoning the ships, started on their journey to the 'North Star,' Beechy Island, in sound health and high spirits. On arriving at the 'North Star,' they had to cut that ship out, and, in doing so, had, while at the saws, to stand up to the middle in water.



THE HIMALAYA AND TIBET

a view of the Mountain System bounded by the plains of India, Gobi, China, and the Caspian.

POINTS ON THE HIMALAYA MOUNTAINS ARRANGED IN ORDER OF LONGITUDE.

(*Extracted from the MS. Records of the Trig. Surv. India, Vol.* 15, 1861.)

	Name of Peak.	Lat.	Long.	Alt
I.	Choomalari	27° 49′ 37″	89° 18′ 43″	23944
II.	Gipmochi	27 16 23	88 56 37	14518
III.	Powhoonri (or Donkia)...	27 56 52	88 53 5	23186
IV.	Choomoonko (or Chola)	27 27 28	88 49 38	17325
V.	Black Rock (Guaream)...	27 34 7	88 48 39	17572
VI.	Narsing	27 30 36	88 19 28	19146
VII.	Pandim	27 34 34	88 15 35	22017
VIII.	Kanchinjinga	27 41 26	88 11 50	27815
IX.	,,	27 42 5	88 11 26	28156
X.	Kabroo	27 36 26	88 9 15	24015
XI.	Jannoo	27 40 52	88 5 13	25304
XII.		27 39 55	87 7 56	—
XIII.	(Sihsur)	27 53 18	87 7 54	27799
XIV.	(Chamlang, East)	27 46 27	87 1 21	24020
XV.	Mount Everest	27 59 12	86 58 6	29002
XVI.	(Chamlang, West)	27 45 16	86 51 56	22215
XVII.	(Sankosi)	27 45 11	86 36 57	22826
XVIII.	(,,)	27 52 46	86 31 57	21987
XIX.	(,,)	27 58 13	86 28 32	23570
XX.	(,,)	27 57 48	86 22 42	23447
XXI.	(,,)	27 57 24	86 9 8	19560
XXII.	(Jibjibia)	28 7 36	85 54 42	21853
XXIII.	(,,)	28 21 3	85 49 21	26305
XXIV.	(,,)	28 10 20	85 49 17	22891
XXV.	Dayabang	28 15 17	85 33 35	23762
XXVI.	(Aku)	28 23 25	85 10 12	24313
XXVII.	(,,)	28 20 38	85 7 24	23313
XXVIII.	(Yassa)	28 25 58	84 41 0	25818
XXIX.	(,,)	28 30 7	84 36 34	25729
XXX.	(,,)	28 32 55	84 36 9	26680
XXXI.		28 39 39	84 21 56	—
XXXII.		28 39 21	84 20 32	—
XXXIII.	(Barathor)	28 29 18	84 13 56	22947
XXXIV.	(,,)	28 32 0	84 9 52	26069
XXXV.	(,,)	28 32 6	84 7 32	24718
XXXVI.	(Morshiadi)	28 34 58	84 1 57	24780
XXXVII.	(,,)	28 29 37	83 59 22	22964
XXXVIII.	(,,)	28 29 48	83 59 20	22986
XXXIX.	(,,)	28 35 38	83 51 46	26522
XL.	(,,)	28 30 59	83 50 55	23641
XLI.	(,,)	28 39 11	83 46 22	22471
XLII.	Dhoulagiri	28 41 43	83 32 9	26826
XLIII.	(Narayani)	28 45 39	83 25 52	25456
XLIV.	(,,)	28 45 8	83 25 12	25299
XLV.	(,,)	28 43 56	83 24 18	24912
XLVI.	(,,)	28 44 2	83 21 20	25095
XLVII.	(,,)	28 40 21	83 19 6	23565
XLVIII.	(,,)	28 43 49	83 15 9	24181
XLIX.	(,,)	28 44 47	83 11 18	23779
L.	(,,)	28 44 30	83 9 29	21727
LI.	(,,)	28 45 53	83 8 27	21472
LII.	(Chaubisi)	28 49 33	82 39 33	19415
LIII.	Api	29 59 7	80 56 22	—
LIV.	Panchachuli	30 12 51	80 28 9	22673
LV.	(,,)	30 15 12	80 25 5	21471
LVI.	Nandakut	30 16 51	80 6 39	22538
LVII.	(Nanda Debi, or Latu)...	30 21 58	80 2 21	24417
LVIII.	Nanda Debi	30 22 31	80 0 50	25661
LIX.	(,,)	30 22 35	80 0 46	25587
LX.	East Trisool	30 16 14	79 54 51	22342
LXI.		30 30 56	79 54 31	23092
LXII.	West Trisool	30 18 43	79 49 7	23382
LXIII.	(Nandakna)	30 22 9	79 45 40	19916
LXIV.	Nandakna	30 20 56	79 45 36	20722
LXV.	,,	30 20 57	79 45 35	20773
LXVI.		30 41 6	79 44 53	22093
LXVII.	Kamet, or Ibi Gamin ...	30 55 13	79 38 4	25373
LXVIII.	Nilakanta	30 43 52	70 26 56	21661
LXIX.	Badrinath	30 44 16	79 19 20	23210
LXX.	(,,)	30 43 22	79 17 52	22511
LXXI.	(,,)	30 46 44	79 16 58	22347
LXXII.	Kedernath	30 47 53	79 6 34	22790
LXXIII.	(Tharlasagar)	30 51 40	79 2 14	22582
LXXIV.	Tharlasagar	30 51 41	79 2 13	22628
LXXV.	Jaonli	30 51 18	78 53 53	21672
LXXVI.	Bus Peak, or Srikanta ...	30 57 25	78 50 50	20149
LXXVII.	Banderpoonch	31 0 12	78 35 45	20758
LXXVIII.	Jamnotri	31 0 25	78 34 6	20038
LXXIX.	Sargoroen	31 6 8	78 32 32	20405

All these peaks are on the Southern Chain except LXVII., which is on the Northern. Many peaks have been observed, since this list was made, on each of the three chains; and some of them, on the Southern and Northern Chains, are included in the list compiled by Prof. Robert von Schlagintweit, from which the names in parenthesis are taken.

Still, no one complained of illness of any kind—a proof that they were just the right men for hard service.

"I may remark here, that during the time I served in the three above-mentioned expeditions, I never drank a drop of lime-juice. I never in my life liked it, and always bartered it for rum. If a total abstainer, perhaps you will be horrified at such a confession. There were many others in the several expeditions in the same category with myself, and I can conscientiously declare that none of us ever had the slightest symptom of scurvy."

THE HIMALAYAN SYSTEM.

(A further reply to an Article in the "Calcutta Review" for January, 1877.)

The snowy peaks of the Himalaya, which are seen in a continuous line from the plains of India for the great length of nearly two thousand miles, have their southern base in those lowlands; while they descend on the north into a succession of elevated valleys. The snowy peaks have been fixed in latitude, longitude, and altitude by the indisputable authority of the Trigonometrical Survey of India; and many of their names, with the observations that define them, are given in the accompanying table.

This remarkable range, including the highest summit known to geographers (Mount Everest), was described and drawn as a distinct chain, in my maps and Memoir on the Mountains of India in 1870; and it was then named the Southern Chain of the Himalaya. The method was adopted by Mr. Markham, the Chief of the Geographical Department of the India Office, and Honorary Secretary of the Royal Geographical Society, and also by the Heads of the Surveying Departments in India, as well as by the best professional geographers. Recently, however, the *Calcutta Review* has denied the existence of this chain, and has also advocated other opinions on the Himalayan System, which are equally inadmissible. Hence, the following brief examination of the whole subject in its general aspects has been undertaken.

To comprehend the Himalayan System, it should be considered in the first place in its relation to the structure of the Asiatic Continent, of which it is but a part. It will then be seen to be a segment of a vast girdle of mountains, which rises on three sides from the Indian, Pacific, and Arctic Oceans respectively, the circuit being completed on the fourth side from the plain of the Caspian. Thus—(1) The Himalayan portion of the girdle is that which ascends from India and the Indian Ocean. (2) From the Pacific and the rolling plains of China, rise in unbroken continuity with the Himalayan portion, those rugged mountains, the culminating ranges of which may take a general name from the Yunling, which stretches south of the Hwang Ho River, and from the Inshan, between the Hwang Ho and the Amur. (3) From the Arctic Ocean and the Siberian plains, the rising ground attains its highest summits in the Yablonoi Mountains which meet the Inshan Mountains at the Amur; and in the Altai-Saiansk Mountains, which is a general expression for the continuation of the Yablonoi westward, from the Selenga River to the Irtish. (4) South of the Irtish, the mountains face towards the west, and rise from the Kirghis and Turkoman Steppes, the waters of which are absorbed by the inland basins of Balkash, Aral, and the Caspian. Here the great girdle is completed by the culminating series, which, beginning with the Ala-tau and ending with the Pamir, connect the Siberian System with the Himalayan.

The culminating belt thus defined forms the proper limits of Central Asia, although it is too common to find countries on the very western verge of the continent wrongly included under that name. Politically, the whole of this Central Region was, and nearly all is still, under the dominion of China. Physically, it may be described as consisting of three elevated plateaus, and an intermediate depression. Of this series, the plateau of Tibet is the highest; the plateau of Kokonor is lower; and the plateau of Mongolia, generally, still lower. The depression, which is deepest at Lake Lob, and is the lowest part of Central Asia, lies to the westward of Kokonor, and between Mongolia and Tibet.

The Southern or Tibetan Plateau is bounded and upheld between the Himalaya on the south and the Kuenlun Mountains on the north. It has the Pamir on the west, and the Yunling and Bayan Kara Mountains on the east. The elevation of its plains is most remarkable, as they exceed at its western extremity 17,000 feet. Its valleys are between 14,000 and 10,000 feet. Its peaks include the highest in the world. Its breadth expands to about 600 miles in its widest part, in the meridian of 90° E. Gr. Its greatest length may be reckoned at 1500 miles. While giving rise to such rivers as the Indus, Brahmaputra, and Yangtsi, it is largely drained into inland lakes. Its whole mass forms the principal subject of this discourse, and will be dealt with more in detail hereafter.

The Middle or Kokonor Plateau occupies an elevated tract, intermediate in position and altitude, between the eastern parts of Mongolia and Tibet. The lake which gives its name to this plateau is 10,500 feet above the sea; and this altitude appears to include the country drained by the Upper Hwang Ho as well as the lake district. The latter, according to Prejevalsky's last researches, maintains this elevation nearly up to Lake Lob. Some of the peaks rise to 14,000 feet. This plateau may thus be considered to occupy a trilateral space enclosed by the Bayan-kara and Yunling Mountains, on the south-west and south-east; and by ranges on the north which connect the Kuenlun and the Inshan Mountains, while they divide Kokonor from the lower Mongolian plain. The Hwang Ho is crossed by the great wall of China, at the foot of its descent from the plateau; where the continuous ranges of the Yunling and Inshan Mountains approach and terminate on or towards its banks.

The Northern or Mongolian Plateau, including the Chinese Governments of Inner and Outer Mongolia and Ili, is buttressed by the Altai-Saiansk and Yablonoi ranges on the north; by the Inshan Mountains on the east; and by the Thian Shan and Kokonor Mountains on the south. Like the other plateaus, the Mongolian also gives rise to important rivers, viz., the Irtish, the Yenisei, and the Amur, while it is also partly drained into inland lakes. The lakes and rivers are almost wholly confined to the northern and western parts of the plateau, where the surface is most mountainous. The southern and eastern parts form the great plain of the Gobi or Shamo Desert, which is almost waterless. This plateau has none of the excessive proportions of the Tibetan highland, except in regard to extent, which is larger. Its elevation may be reckoned from 12,000 to 3000 feet, and its greatest heights occur on the western summits. The eastern part indeed is of trifling elevation, except in comparison with the low maritime plains from which it rises.

Between the Thian Shan Mountains on the north, the Kuenlun Mountains on the south, the Pamir on the west, and Kokonor on the east, is a depressed plain which slopes from about 4000 feet above the sea at the foot of the mountains, to 2000 feet in its lowest part, at Lake Lob. According to Zimmerman the altitude of Lake Lob is only 1280 feet. The mountains themselves attain to heights of 20,000 to 25,000 feet. The margin of this depressed plain is occupied by many towns, beginning with Khotan at the foot of the Kuenlun, and including Yarkand, Kashgar, and many others as far as Hami, which ends the urban circuit, at the eastern extremity of the Thian Shan Mountains. In the midst of the plain is the western extremity of the Gobi Desert, which extends eastward through Mongolia. The nature of the transition from the low swamps of Lake Lob to the higher part of the Gobi, where the caravans pass between Hami and the Kiayu gate in the Chinese Wall, is unknown. But it may be inferred from Prejevalsky's last journey that the depression is terminated by mountains on this side, as elsewhere.

In bringing to a conclusion this general and introductory view of the encircling structure to which the Himalayan System belongs, it is desirable to allude very briefly to the rest of the Asiatic Mountains, as they may all be regarded as offsets from the exterior of the great girdle. These offsets emboss the maritime slopes of the continent, and stretch out to its extremities. (1) From the Tibeto-Himalayan System, proceed all the ranges or spurs that cover China and the South Eastern Promontory. (2) The highlands of India, south of the Ganges, at one time probably filled the intervening valley and were continuous with the Himalaya. (3) The Hindu Kush System with its prolongations, slopes, and expansions, also emanates partly from Himalaya and partly from Pamir, a division which will require some discrimination in the further examination of the Himalaya. To that attractive subject we have so far endeavoured to prepare the way, which we will now attempt to pursue.

II.

Let a geographer be supposed to be entering upon the study of the Himalaya Mountains, in his closet, or a traveller to be about to explore them from the plains of India, the most prominent feature that will appeal to the notice of either is the great range of snowy peaks, stretched out in a continuous line above the plains of India, from one end to the other, for about eighteen hundred miles.

One would at this time naturally expect student and traveller alike to come to the conclusion that these peaks form the culminating summits of the slopes that have their base in the great Indian plain. But in earlier days, when Himalayan surveying was only beginning, it was not so easy to reduce the mighty maze or labyrinth of mountains to an intelligible plan. Mr. Markham has already written the history of Himalayan geography, and explained the part taken by successive contributors. Its history presents a remarkable example of the enduring influence of an authority, when once it has become recognised, in the case of Captain Herbert's attempt, for the first time, to elucidate Himalayan structure, in 1818. He had only a very limited knowledge of the subject, and adopted an erroneous principle. The Trigonometrical Survey of India had not then fixed the position and altitude of the peaks, nor surveyed the mountains from the plains of the Punjab to the plains of Khotan. The Himalayan Missions and Native Explorers had not then crossed the mountains at various parts, defining positions and altitudes with scientific accuracy. If Herbert's original mind had possessed these advantages, it is probable that he would have made excellent use of them, and have escaped the mistaken principle which a narrow induction and a false definition led him to adopt. He unfortunately assumed that a succession of peaks in the same direction did not constitute a chain, if rivers rising on one side passed between the peaks to find their outfall on the other. His heretical definition has been recently repeated with less excuse by the *Calcutta Review*, which, in an elaborate argument, contends that "the essence of a chain is the continuous and close connection of its links," and denies that a succession of peaks in the same direction forms a chain, if rivers run between them.

The answer to the question, "What is a chain?" must be taken from that general acceptance of the meaning of the word which is declared by dictionaries; and no individual writer is entitled to set up an interpretation contradicting such authority. It is surprising that a literary periodical of the high standing that may be justly attributed to the *Calcutta Review* should have to be taught this elementary canon of criticism. On the part of the editor, it must be an oversight; on the part of the reviewer himself, it is too manifest that he has been blinded by a disposition to oppose every effort for the development of Trans-Himalayan trade; that in this spirit he has taken Mr. Markham's book as a medium of attack, adopting Herbert's fallacy, and exposing every supposed mistake in the book that the keenest scrutiny could discover, to throw discredit on Mr. Markham's advocacy. With what success those can fairly judge who have read the answers to the review in this magazine.

It may be anticipated from these remarks that the dictionaries do not confirm the definition of a chain given by Captain Herbert and the reviewer. A chain is not only "a series of links or rings passing through one another";—but also, "*a number of things coming after each other.*"* For example,—a chain of events, a chain of pools, a chain of islands, a chain of mountain peaks. These are common expressions which everybody understands. It would be more to the purpose to deny to the chain of peaks to which the reviewer objects any features whatever that warrant their destinction as a separate chain. But he contents himself with a single objection, viz., that being occasionally intersected by rivers they are not therefore a chain. We shall endeavour to prove that they are.

---

* See Chambers' *Etymological Dictionary*.

We have already alluded to the Himalaya as upholding the plateau of Tibet. In a general way the mountains may be said to rise from the plains of India, but in fact they are often separated from the plains by low hills called the Sewalik, except between the Jhelum and the Indus, where the hills expand into a low plateau, fringed at the edge of the plains by the Salt Range.

The culminating summits of the southern slope of the Himalaya, is formed by the chain of peaks to which the *Calcutta Review* objects, but which we insist on calling the Southern Chain of the Himalaya. There can be no question either about the culminating quality of the peaks, or their sequence in the same line. One is determined by observations for altitude, and the other by observations for latitude and longitude; and as both are vouched for by the Trigonometrical Survey of India, there is no more room for disputing them than for disputing the dictionaries from which our definition of a chain is taken. To make the matter quite clear, a tabulated list of the peaks in question with their co-ordinates of position and altitude is attached. The accompanying map is based on such observations, and generally illustrates the paper.

The Southern Chain descends on the north and finds its base there in a succession of valleys, which divide it from another range of mountains termed the Northern Range.* The reviewer asserts that the peaks of our Southern Chain belong to spurs extended from the Northern. But it will be made clear that the separation between the two ranges is effected by valleys of such length and depth, as to make it untrue and unreasonable to say that these valleys are crossed repeatedly by spurs connecting the peaks on their opposite sides; especially remembering that rapid rivers run along these valleys, and afford a convincing proof that no obstacle of the kind interrupts the flowing streams. Some of these valleys are upwards of a hundred and two hundred miles in length, and from 10,000 to 15,000 feet lower than the parallel ranges and chains of peaks which they so effectually divide.

The valleys which separate the Northern and Southern Chains are generally among the most remarkable and best known in the Himalaya. They include the valleys of—Kashmir, watered by the Jhelum; the Chandra-Bagha, above Kishtwar; the Spiti and Baspa, affluents of the Sutlej; the uppermost valleys of the Bhagirati and Alaknanda, head-waters of the Ganges; the uppermost valleys of the Kali, Karnali, and of some affluents of the Gandak; the Palgu Lake and the Kuti Valley, with the broad plain of Dingri, and the Chomto Dong Lake, all in or adjoining the Kosi basin; Turner's lakes, and the Painom which joins the Sanpu; and finally, the Nichu, Lopra Cachu, and Omchu, which join the Brahmaputra in Assam.

As an example of the way in which the Southern Range is divided from the Northern, take that part of the Southern Chain which includes the great peaks of Dayabung (26,305 feet), Mount Everest (29,002 feet), and Kanchinjinga (28,156 feet). (1) Between Dayabung and the Northern Chain is the Palgu Lake. (2) Between Mount Everest and a very high peak in the Northern Chain is the Dingri Plain, 13,860 feet above the sea, or about 15,000 feet *below* Mount Everest, and so broad and flat that several regiments of cavalry might be manœuvred on it. (3) Between Kanchinjinga in the Southern, and Lagulung Pass in the Northern Range is the Chomto Dong Lake, 14,700 feet above the sea, or only half of the height of the southern peak. Similar examples are found in the Kashmir and Chandra-Bagha Valleys; indeed, throughout the vast extent of these parallel chains, there is nothing to interfere with the separation between the two chains; nothing to warrant the treatment of peaks like Everest as if they belonged to spurs from another range of a superior rank.

In connection with the Southern Chain, there are two classes of rivers that serve to mark its character as a range, almost as well as the continuity of its lofty summits. (1) The first includes the rivers already named, which rise on its northern slope and flow along it for considerable distances, before they pass through fissures in the chain, to descend down to the plains. (2) The second class consists of rivers that have their sources solely along the southern flanks of the range, and thus give it the character of a partial water-parting; which, indeed, is all that can be attributed to the Northern Chain, as we shall show presently.

Among these secondary rivers are the Ravi and the Beas, of the Punjab; the famous Jumna; the Ramgunga and the Kosila, of Kumaon; some affluents of the Gogra; several tributaries of the Gandak; the Bhagmati, of Khatmandu; all the affluents of the Kosi, south of Mount Everest, except the Butia, including the Indrawati, San Kosi, Dudh Kosi, and Tambur; the Tista, of Sikkim; the Ammochu; the Machu and Pachu; the Mattesam; and all the affluents of Monas, except the Lopra Cachu.

How shall we find a general designation for the common origin of all these rivers, if we are denied the existence of the Southern Range? Certainly, they have nothing to do with the Northern Range.

We conclude, then, in favour of the Southern Chain:—(1) As the culminating summit of the Southern or Indian slope; (2) As the common origin of a succession of rivers; (3) As cut off from the Northern Range by a succession of remarkable valleys, sometimes very long, sometimes very deep, and sometimes very broad and flat, and all containing considerable rivers, running parallel to the chains which they divide.

Further attention may now be paid to the Northern Chain. It rises on the south from the beds of the streams which have been already described as dividing it from the Southern Chain; and it separates those streams from the parallel courses of the Upper Indus, Sutlej, and Sanpu, which in succession define its northern base. No heights equal to Mount Everest, or Kanchinjinga, have yet been found in it; but only the western part is well known and surveyed. There a few heights exceed 25,000 feet, and there are many above 20,000 feet. Glaciers are more abundant than in the Southern Chain.

From the boundary of Kumaon and Nipal eastward, or between the meridians of 81° and 95°, the

---

* This Northern Chain is Mr. Markham's Central Chain, and the reviewer's Southern Watershed.

Northern Chain has only been barely made known to geographers at eight points along the whole distance of a thousand miles. These occur (1) at the source of the Karnali, between Western Nipal and the Upper Sutlej; (2) at Muktinath, and (3) at Somnath, or No Pass, both between Central Nipal and the Sanpu; (5) at Dango Pass, and (6) at Lagulung Pass, both between Shigatze, in Tibet, and the Arun, in Eastern Nipal; (7) between Gianzejong and Gangamar, on the River Painom, on the route between Western Butan and Lhasa; (8) on the Towang route between Lhasa and Assam.

With the Trigonometrical Survey on the west, and these explorer's reconnoisances on the east, the summit of the Northern Range can be traced with some distinctness, while its northern base is unmistakably defined by the prolonged courses of the great rivers flowing through the same trough, although in opposite directions. The Upper Indus and Sanpu are of such lengths and magnitudes that no one has suggested such an amalgamation of the mountains on either side of them as the *Calcutta Review* advocates between our Northern and Southern Ranges. Not even the reviewer imagines spurs extending across the prolonged trough of the Upper Indus and Sanpu.

But the reviewer, following Mr. Markham, agrees with him in considering the mountains on both sides of the trough as Himalaya. In my original discussion of this subject, the Himalaya is limited between the south side of the trough and the plains of India. With the best disposition to concur in the newer view, my own method seems to me to be the more symmetrical and convenient, more consistent with the nature of rivers and mountains. For the present purpose a river may be likened to a geometrical line, having only the one dimension of length, but neither breadth nor depth. It can be conceived to be absent altogether, without disturbing the form of its channel, or any other feature of the ground. The dry channel, or a line along the bottom of the valley, would equally serve our present purpose.

The result is very different if the summit of a mountain be taken as the line of separation between one orographic system and another. A mountain is not a line like a river, which can be separated from the rest of the ground without disturbing its form. The mountains on the north of the Sanpu are the contreforts, buttresses, slopes, or escarpments of the table-land which they support; and they cannot be cut off from it. If a drawing or model be made of that table-land, you cannot terminate it on the south at the top of its own slope, and say that the table-land is Tibetan, and the slope is Himalayan.

The whole mass, with all its slopes, forms the Tibetan Plateau, just as the whole mass, with all its slopes, from base to base, between the Upper Indus and the plains of India, forms the Himalaya. It might fairly be discussed, whether the term "Himalaya" should extend beyond my Southern Chain; and whether the Tibetan Plateau should not be limited by the rivers that form the northern base of that chain. Such a definition would be more consistent with the political limits of Tibet, and the extension of the natural features that distinguish the whole table-land from the outer slopes of the Southern Chain. It may also be argued that the earlier use of the name was confined to the snowy peaks of the Southern Chain, when all beyond was unknown. I conclude that the extent and simplicity of the line of the great rivers, as well as the symmetry and compactness of the mass which they help to define, is in favour of my original method. Both this question and the one relating to the Southern Chain involve geographical principles, and to be fully discussed they deserve to be illustrated by apposite examples, drawn from various parts of the globe. But such a treatment is inadmissible within the present limits. I conclude the discussion of this point by reminding the reader that my Northern Chain is Mr. Markham's Central, and the reviewer's Southern.

It may have been observed that no attempt has yet been made to deal with the eastern and western limits and extensions of the chains, which have been reached on our progress northward. The fact is, that the fundamental elements of this part of the great Asiatic girdle are to be found on the path of the central section, which we have been pursuing. Thus far a Southern Chain has been established, and the succeeding one has been defined as the Northern Chain of the Himalaya, contrary to the views of others. The next range rising from the beds of the Upper Indus, Sutlej, and Sanpu rivers, belongs to another system, which we call the Tibetan.

The Tibetan Plateau, as distinguished from the Himalayan, extends from the Upper Indus and Sanpu, on the south, to the depressed plains of the Gobi, on the north; and between those limits it has a breadth, in the widest part, of about 500 miles. Like the Himalayan Plateau, it is bounded by two chains of mountains, which, descending to the plains on the north, and the rivers on the south, are divided by the greatest breadth of the plateau, on the east, where the elevated lake basin is spread out, while on the west the bounding ranges are only separated by the upper valleys of the streams which water the plains between Khotan and Yarkand.

The Southern Chain of this part of the system is called the Gang-ri, or Gang-dis-ri, so far as it separates the Sanpu and Indus basins from the elevated lake basin of the Tibetan Plateau. To the westward this elevated lake basin is succeeded by the basin of the low-lying lake Lob, and the mountain range which divides the Lob basin from the Indus basin, although a continuation of the Gangri Mountains, is conveniently distinguished as the Karakoram Range.

In the Karakoram Mountains the geographer has again to contend with the limited conceptions of the observer on the spot. Because the summit of the Karakoram is in part flattened, Mr. Shaw denies that it is a range. He would thus deprive us of a general term, denominating a lofty water-parting between two distinct drainage basins, which is also marked by numerous peaks, though here and there presenting smoother summits.

But if any mountains be entitled to the name of a range it is the Karakoram, for the following reasons:—(1) Its culminating summit attains a height of 28,278 feet in the peak labelled K 2, and otherwise unnamed by the Trigonometrical Survey. This peak is next in height to Mount Everest. We have repeatedly urged that it should be named after Sir George Everest's successor, Sir Andrew Waugh; and if Mount Waugh be not sufficiently euphonious, let it be called Mount Andrew. It has many other peaks exceeding 20,000 feet, and its principal pass is 18,000 feet above the sea. It is, therefore, not wanting in height. (2) It forms an unbroken water-parting between the important drainage basins of Lake Lob and the Indus, and in that respect is more perfect than the Himalaya. (3) Its length exceeds 300 miles; and whether we regard its height, its length, its water-parting, its passes, its bold and massive character, its extraordinary glaciers, or its deep gorges, it is certainly one of the most remarkable ranges in the world. The lamented traveller, J. W. Hayward, argues with us in defence of the name and extent of a Karakoram range.*

If we may be allowed to compare great things with small, a parallel may be found in a range of roofs running along the side of a street. Because some of the roofs are ridged, and others are flat, while some have tall steeples, is this variation of the form of the continuous housetops to prevent them from being regarded as the range? We think not.

The same author has also committed himself to the opinion that the Pamir (or the mass between the Gobi and Aralo-Caspian plains) is, instead of a meridional range, a series of latitudinal ribs or ridges running east and west.† But these ribs or ridges are, in fact, only the spurs descending from the flanks of the meridional ranges, the direction of which is defined (1) by their bases in the plains; (2) by the continuity of the chain of peaks which mark the summit of the ranges; (3) by the water-parting between the Tarim and Aralo-Caspian basins.

In thus correcting an able traveller, it may be well to add, that the local observation of a great phenomenon is apt to be mistaken by the effect of a vast object on limited vision, the function of which object is to be properly estimated, not so much by its apparent as by its relative conditions.

A large part of the Karakoram has been delineated by the Trigonometrical Surveyors, but there is a portion of its western extremity that remains unexplored. It lies between the Mustagh Pass, the Neza Tash, and Karambar Pass; and its southern edge is defined by a range of peaks fixed in position and altitude. It is said to be traversed by four passes named Kalik, Mintaka, Gundarab and Karachankar; and these are supposed to cross a range distinct or superior to the fixed peaks. The probability is that the peaks form the edge of a plateau, the northward side of which has not been defined.

The Gangri Range is only known at its extremities. It has been crossed in several places between the Ling-tzi Plain and the Manasarowar Lake. But from thence to its eastern termination, where it meets the mountains that divide the elevated lake basin from the basins which succeed that of the Sanpu, it has been crossed, in two places only, by the scientific observer, employed in Himalayan exploration. The missionaries Huc and Gabet also crossed the range and describe its difficulties. They name it the Tant-La. Of the passes crossed by the explorers, one is the Khalamba Pass, mentioned by the Calcutta reviewer, in a part of the range which bears the local name of Nyen-chen-tang-la. The other is the Dam Lhargan Pass, and the two lie between the Tengri Lake and the Sanpu. Several altitudes of the Gangri have been observed above 20,000 feet; as the Aling Gangri, 23,000 feet; the Nyen-chen-tang-la, 23,600.

Parallel with the Gangri Range, but at a distance generally of 70 miles, the plateau itself has been recently explored along a route between the Pangong Lakes and Lhasa. It has also been crossed at its western end, between Manasarowar Lake and Khotan, and between Khotan and Changchinmo. The altitude of this immense plain is 16,000 feet above the sea at Thaldat, in the west, on the Changchinmo route, and 15,190 feet on the surface of the Tengri Lake, in the east of the plain. We reserve the consideration of its extensions on the east and west, according to the design already mentioned, and proceed to notice the range which forms the northern boundary.

The Kuenlun Mountains are believed to extend continuously between the Tibetan Plateau and the Gobi Desert. They are known to do so at the western extremity of the plateau, and as far east as 81° 30′, where the Kuenlun Mountains form the culminating summits of the slope upwards from the plain about Khotan. The lofty range which divides the eastern part of the Tibetan Plateau from the lower steppe of Kokonor, was crossed by Abbé Huc, in 1846, and also by Captain Prejevalsky, in 1871, and this range is said to be a continuation of Kuenlun by various authorities. Indeed, when one considers the great altitude of the Tibetan Plateau, it is easier to conceive its descent to the Gobi by the steep slopes of a mountain range, than by a gentler decline. The termination of the plateau, on the north, by a mountain range similar to the Himalaya, which terminates it on the south, appears to be more probable than any other theory. When the reviewer states that no peaks could be seen by the Pundit to the northward of Tengri Lake, he might have added that the Kuenlun is about 400 miles distant, and as the lake is 15,190 feet above the sea, an addition of 5000 only would make the Kuenlun exceed 20,000 feet, a height which it often attains further west. If Colonel Walker, as the reviewer remarks, is judiciously silent on the subject, it is easily explained, because his map ends near Khotan, with the limit of the surveys. What other ground the reviewer has for a doubt, insinuating denial, we know not.

In defence of the Lama survey of Tibet, against the reviewer's remarks, it is fair to state (1) that their delineation of the Sanpu, as well as the general accuracy of its confluents, and of the towns on its banks, has been confirmed by the Pundit's observations; (2) that the same authority establishes their form of Lake Palti, in preference to Mr. Bryan Hodgson's; (3) their position of Tengri Lake is essentially confirmed; (4) the last route of the Pundit, by Towang, coincides with places on the Lamas' map. No doubt we could point to inaccuracies, but we leave others to find fault with such an original work, and gladly express our gratitude for essential parts of it, which have stood the test of the latest research.

The leading features of the Great Southern Plateau having now been traced from India to the plains of Gobi, it will be remembered that they consist: (1) of the snowy range of peaks, that have been triangulated from the plains of India, and form the Southern Chain of the Himalaya; (2) of an inner or Northern

---

* *Royal Geographical Society's Journal*, xl., p. 66.
† *Ibid*, xlvi., p. 266.

Chain separated by deep valleys, running waters or broad plains from the Southern Chain, and having their northern base distinctly defined by the courses of the Upper Indus, Sutlej, and Sanpu, through a continuous trough, with a length of about 1400 miles; (3) of a third chain, formed by the Gangri and Karakoram Mountains, rising from the Upper Indus and Sanpu, and dividing the basins of those rivers from the elevated lake plateau of Tibet, and the depressed lake basin of Lob; (4) of the broad and elevated lake plateau of Tibet, and its prolongation westward into the upper valleys of the Lob basin; (5) of the Kuenlun Mountains which have their northern base in the Plain of Gobi, and divide it from the elevated plateau of Tibet. The meridional section on the accompanying map will help the mind to realize the conditions of the mass and the relative position of its great features. We may here also refer to the accompanying fac-simile of the original map which appeared with Mr. Bryan Hodgson's paper on the Physical Geography of the Himalaya, dated 1846, and printed in 1857. It is an illustration of the system advocated by Captain Herbert, Mr. Bryan Hodgson, and the *Calcutta Review*. Its scale is the same as that of the other map, and thus the comparison of the two is facilitated as much as possible.

III.

Himalayan geography, so far as we have hitherto proceeded, is a matter of comparative simplicity, and based on grounds that can be defined, to a great extent, with precision; but when we endeavour to trace the connection of the Himalayan System with those that belong to the Pacific slopes, on the east, and to the Caspian slopes, on the west, the difficulties decidedly increase.

In both directions we have to advance only to a small extent, on knowledge that is complete and certain, and to a much greater extent on information that is neither complete nor well ascertained. Still we shall aim, notwithstanding the *Calcutta Review*, at giving distinctness to the conceptions which are to be derived from this mixed material. We see no necessity to delineate every river course with dots, because it requires confirmation; or to break the continuity of mountains, because their delineation rests on uncertain data, if on anything better than hypothesis. In works of the kind in question some dependence must be placed on the intelligence of the public. They are not totally ignorant who take an interest in these advanced subjects, and we need not treat them like babies. Our reviewer has picked up a few practical notions, but his experience does not qualify him to use them judiciously.

There is no greater stumbling block, no more invincible obstacle, to geographical progress, than chaotic or confused notions. Let us only see some meaning in the work, and we may then proceed to enquire whether it is right or wrong. Mountains blurred over the face of a map, however well executed, would be better omitted. In the present case we hope that a series of geographical enquiries, involving widely-spread scientific observations, that may either confirm, modify, or contradict our suggestions, will be an early consequence of the following attempt to trace our Himalayan System eastward and westward, and to ascertain its equivalents in the Pacific and Caspian sections.

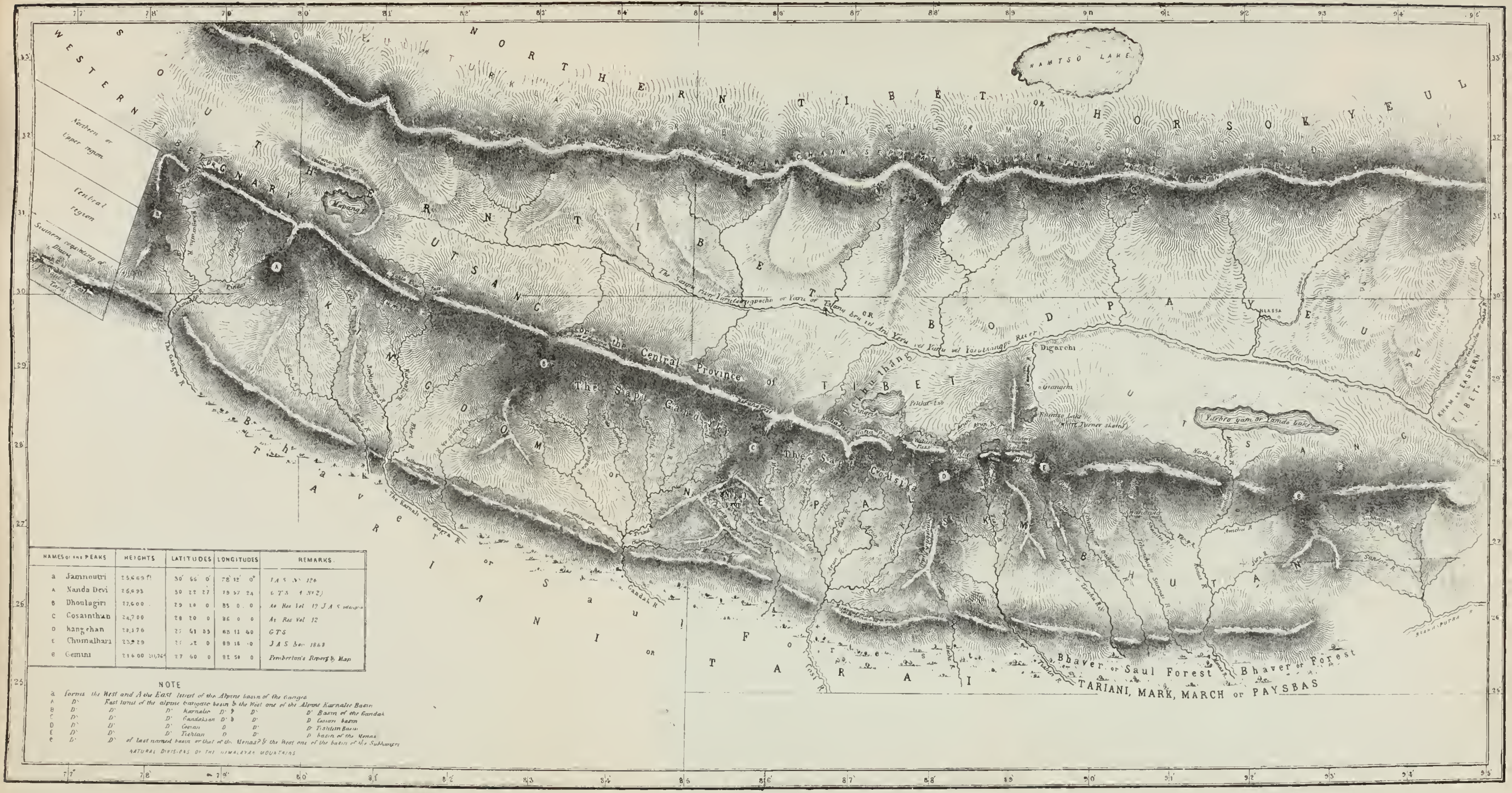
It has been demonstrated by undeniable observations that the slope of the Himalaya upwards from the plains of India, culminates in the range of snowy peaks called the Southern Himalaya. This range is traced without difficulty as far as the gorges by which the Indus and Sanpu undoubtedly cut through the Northern and Southern Chains on their descent to the plain, although it seems like a national reproach to confess that neither of these great Indian rivers has yet been explored along these intersecting gorges. The Sutlej, which is known throughout, makes a precisely similar descent, and the character of the unknown gorges may be inferred from it.

The Sutlej is 10,597 feet above the sea where it enters the Northern Chain at Shipki, and 1100 feet where it leaves the base of the Southern Chain at Ropur. The Indus is only 4500 feet at Acho, where it enters the gorge; it is 891 feet at Attock, where it receives the Kabul River, and 700 feet at Kalabagh, where it reaches the plain at the foot of the Salt Range. The Upper Sanpu has not been seen below 11,350 feet at Dhomda, till it enters the Plain of Assam.

On passing beyond the Indus and Sanpu, the set of the ground in both cases undergoes a change. The western side being the better known, we proceed to discuss it first.

The summit of the Southern Chain is defined to the westward of Kashmir by the line of peaks which rises from the right bank of the Jhelum between Kashmir and Mozufferabad, and is continued from thence to the Indus between Palus and Thakot, at a height of 14,300 feet. Proceeding from the same point to the west of the Indus, we take as our clue to the continuation of the Southern Range, in the present defective state of our information, those observed peaks which extend from the Indus to the Chitral or Kunar River at the height of 14,800 to 17,000 feet. The base of the range is in the Plain of Peshawar, which having the same altitude at the foot of the mountains, as that which occurs all along the Southern Range, that is, about 1000 feet, may be considered as an outlier of the Indian Plain. Similar altitudes are found in a continuous line rising from the western or right bank of the Chitral or Kunar River, from Asmar to its confluence with the Kabul River at Jalalabad; and the same range is prolonged in a great curve from the Kabul River, up to the Hindu Kush at Khawk Pass, its base being defined by the affluent of the Kabul River, which descends from the elevated Panjshir Valley. The altitudes of that part of the range, which runs parallel with the Kabul River, culminate in 15,337 feet.

The range thus defined is of no mean importance. Its physical features are so difficult of access as to make it a political barrier against Afghan domination. Indeed, the mountains enclosed by the Panjshir on the west, the Chitral River on the east, the Hindu Kush on the north, between the Khawk and Dora Passes, and the Kabul River on the south, occupied by the Siahposh Tribes, or Kafirs, have proved an impregnable defence against all the surrounding Mahommedanism, enabling the ancient faith and independence of these highlanders to be maintained to this day. The other states, more or less independent, include the Mohmand Hills, A FAC SIMILE OF "A SKETCH MAP OF THE PRINCIPAL NATURAL DIVISIONS OF THE HIMALAYA" BY B. H. HODGSON ESQ. 1857.



NAMES of the PEAKS		HEIGHTS	LATITUDES	LONGITUDES	REMARKS.
a	Jamnoutri	25,669 ft	30 56 0	78 12 0	J A S No 126
A	Nanda Devi	25,693	30 22 27	79 57 24	G T S (4 No 2)
B	Dhoulagiri	27,600	29 10 0	83 0 0	As Res Vol 12 J A S [illegible]
C	Cosainthan	24,700	28 20 0	86 0 0	As Res Vol 12
D	Kangchan	28,176	27 41 55	88 11 60	G T S
E	Chumalhari	23,929	27 52 0	89 16 0	J A S Nov 1848
e	Gemini	21,600 31,764	27 60 0	92 50 0	Pemberton's Report & Map

NOTE

a forms the West and A the East limit of the Alpine basin of the Ganges
A D° East limit of the alpine Gangetic basin & the West one of the Alpine Karnalie Basin
B D° D° D° Karnalie D° & D° D° Basin of the Gandak
C D° D° D° Gandakian D° & D° D° Cosian basin
D D° D° D° Cosian D° D° D° Tishtam Basin
E D° D° D° Tishtan D° D° D° basin of the Monas
e D° D° of last named basin or that of the Monas? & the West one of the basin of the Subhansiri

Chitral and Mastuj, Bajawar, Panjkora, Swat, Buner, and the tribes in the Indus Valley beyond the frontiers of Hazara and Kashmir. This is a question of so much importance that it will be noticed again in connection with the extension of the Mountain System to the north.

Before we proceed in that direction it is needful to observe that in connecting the Southern Range with the Khawk Pass of the Hindu Kush, a departure has been made from its proper course as the culminating summit of the slopes which have their base in the plains of India. The temptation to do so lies in the desire to point out the relation of the Southern Range to the independence of Kaffiristan and the rest of these Hill States.

In proposing to continue the Southern Range beyond the Kabul River, we must go back to the Plain of Peshawar, and connect it, by way of the Indus, with the great plains of India at Kalabagh, where the Indus debouches from the low hills of the Salt Range. Here it is obvious that the mountains which for 1800 miles skirted the northern and north-western edge of the plain, are now found extending almost at right angles to that direction. The culminating summit of their slope towards India is generally supposed to rise only to 11,300 feet in the Takht-i-Suleiman, or Throne of Solomon, which gives its name to the range. But there is a higher peak in the Mahsud Waziri country, rising to 11,580 feet. Between 29° and 30° north latitude, the range makes a bend to the westward for about 150 miles, near the frontiers of the Punjab and Sind, as well as of the Affghan and Beluch territories. At the Bolan Pass the range resumes its meridional course, and takes the name of the Hala Mountains, till it terminates in the Arabian Sea, at Cape Monze.

Our task is now to trace the line connecting the Southern Range of the Himalaya with the Suleiman Mountains.

Regarding Peshawar as the pivot on which the rectangular change of the mountain-face takes place, we may note that while Peshawar is 1165 feet above the sea, the Valley of Jalalabad, which lies further up the Kabul River, is 1960 feet at Jalalabad, and 1400 feet at Lalpura. The famous Khyber Range, culminating in 5270 feet, divides the two valleys, except where the Kabul River connects them through a narrow gorge. The Khyber is merely a continuation of the hills which fringe the plain of Peshawar and form the foot of the mountains. Again, the Jalalabad Valley is succeeded, on the same stream, by another valley at a much higher level, exceeding 6000 feet, in which the city of Kabul is situated. The Jalalabad and Kabul Valleys are separated by the Karkacha Ridge, which is crossed by four passes, at heights rising to 8000 feet. The Karkacha Mountain is an offset from the Safed Koh Range, which has its northern base along the Kabul River, and culminates at an altitude of 15,622 feet. At the head of the Kabul River are the continuous Vales of Ghorband and Panjshir, rising to 9000 feet, and enclosed by the parallel ranges of the Hindu Kush on the one side, and of the Pagman and Siahposh Mountains on the other. Finally, the Safed Koh may be considered to be—either the commencement on the north, of the mountains which stretch southwards to the sea, and have the River Indus for their Indian base,—or as the connection between those mountains and the Himalaya. But we must refrain from entering further into their orography, and revert to the Himalaya.

One remark, however, we take this opportunity of adding. The Suleiman Range, like the Southern Range of the Himalaya, is not the water-parting of the Indus. That is represented by a parallel range to the westward, which in some parts is 120 miles distant from the Suleiman Mountains, and serves to divide the basins of the Helmund and Indus. This intermediate highland of the Lower Indus is very little known. It is occupied by independent tribes, which are no more subject to the dominion of the Amir of Kabul than they are to that of the Lieutenant-Governor of the Punjab, although their country is regarded as a part of Afghanistan. Certainly such a state of things is anomalous, and alike inconsistent with the peace of the British frontier, and the safe passage of trade to and from India. Further south, where the frontier divides Sind and Baluchistan, the water-parting separates the Indus from the basins of the Purali and Hubb Rivers. In that quarter recent political changes promise a better prospect of a settled border.

Before we proceed to trace the western extension of the Northern Chain of the Himalaya, and of the other interior chain which includes the Gangri and Karakoram Mountains, it is believed that the comprehension of the subject will be facilitated and advanced by taking up, previously, those other bounding chains which, like the Southern Himalaya, serve to limit and give precision to the area under discussion. These have their bases in the Gobi Plain on the east and the Aralo-Caspian Plain on the west; and if we select the town of Jhelum, in the plains of India, as a pivot or centre, then equal radii of 400 miles mark the distances from it, across the mountain mass, to the edge of the Gobi Plain on the north-east, and to the edge of the Aralo-Caspian Plain, near Kunduz, on the north-west, it is within this radius that our inquiries may be nearly confined; and we will begin with the Kuenlun Mountains.

The Kuenlun are best known where they rise from the Gobi Plain between Kiria, Khotan, and Yarkand. At those places the plain is successively 4570, 4490, and 3923 feet above the sea. The mountains rising from the plain between Kiria and Khotan attain to 23,887 feet, before they descend on the south to the broad and elevated lacustrine plateau, which is here 16,000 feet above the sea, and partly occupies the interval between the Kuenlun Mountains and the Karakoram Range. The interval is defined westward by the parallel course of the Upper Yarkand River, midway between the ranges.

In the absence of distinct observations for altitude, bearing on this question, we trace this part of the Kuenlun (1) to the summit of its descent to the plain along the right bank of the Yarkand River; (2) then we cross the river and take the end of the Khandar Range, near the Khandar Pass; (3) next we cross the unnamed river and gorge descending from Tashkurghan, and ascend to Tagharma Peak, 25,500 feet, where we are again on sure ground.

For the eastern extension of the Kuenlun, we refer to our previous statement, and have nothing to add. With regard to its extension westward, the direction of the range makes a rectangular bend nearly where the Yarkand River enters the plain, and alters from a longitudinal to a meridional direction, which it retains to its northern extremity.

It has been already stated that the Gobi Plain has the Thian Shan Mountains rising from it on the north; and we have now to determine where those mountains are divided from the Kuenlun. Without dogmatizing when information is imperfect, it may be proposed to consider the slopes and summits west of Kashgar to be Kuenlun, and those north of the same city to be Thian Shan; the actual line of separation being fixed along one of the streams that descend to the plain at Kashgar. We should select for this purpose that stream which most distinctly marks the interval between the Narin basin and the Oxus basin, but information is not yet precise enough to make the selection.

In the present state of knowledge, we can only mention on this northern extension of the Kuenlun, one other peak besides the Tagharma. It has been called by Mr. Shaw, the Tash-balik Mount, and its height is 22,500 feet. There is no doubt, however, about the continuity and distinctiveness of this Kuenlun Range, as the culminating summit of the slope towards the Gobi Plain.

On the Aralo-Caspian side, the lowland plain extends eastwards along the Valley of the Amu or Oxus, beyond Kunduz, where it is only 500 feet above the ocean. The great plain is flanked on the south by a range of mountains which rise abruptly from it in a continuous wall, all the way from the Caspian to the head of the Lower Oxus Valley above Kunduz. This fringing range of 1000 miles in length, has only been distinctly delineated, where it forms the northern frontier of Khorassan, between the meridians of 55° and 62° east long., and rises to 7000 feet. See the Hon. G. Napier's map in the *Journal of the Royal Geographical Society*, vol. xlvi., in which the southern base of the range may be traced along the valleys of the Atrek and Mashhad. From Sarakhs to Balkh and Kunduz, the base of the range is equally well defined, and its abrupt slopes rise into mountainous summits, but there is no record of their height. General Ferrier describes the range south of Khulm, as a chain of high mountains rising almost to a peak, of great elevation. The altitudes observed between Kabul and the Oxus have only been taken along the routes, and relate to the passes and valleys but not to the summits and ranges. The rivers and valleys are also but little known. With this limited information, we can only fix the summit of the outer range at a few points. Fortunately, one of these points is at Lataband Pass, where the mountains terminate the plain, and divide the lowland from Badakshan.

Badakshan and the Lataband Range stand in a similar relation to the Caspian lowland, to that which the Vale of Kashmir and the South Chain of the Himalaya bear to the Plain of India. With Kunduz at 500 feet, the Lataband Pass is 4920, and the summits of its range probably rise from 6000 near the plain, to 15,000 at its junction with the Hindu Kush. The basin of the Kokcha, which includes Badakshan, is 3500 feet at Fyzabad, and lies between the Lataband and the snowy range of Khoja Mohamed. Pursuing the comparison of this Oxus section with that across the Himalaya, we find in the snowy range of Khoja Mohamed the counterpart of the Northern Himalaya. The height of this snowy range has only been taken on the Pass of Ishkasm, where it is 10,900 feet. The peaks have not been measured, but the range joins the Hindu Kush, at Nuksan Pass, which is 17,000 feet; and from thence a spur descends to Chitral, in the valley, which is only 7140 feet, where it meets the prolongation of the Northern Himalaya, which rises on the east of Chitral, in a series of peaks of 18,900 feet. We are inclined to believe that the Khoja Mohamed Mountains will be found to be prolonged across the Oxus, between Wakhia Bala and Wakhia Pain;* and, also, onward across the Surk-ab River, to the high mountains which divide the Zarafshan from the more southerly affluents of the Oxus, and terminate at Shahr-i-Sabz.

The western base of the northern prolongation of the Kuenlun is not well known, but it may be safely said to be very plainly defined on Captain Trotter's large scale map of the routes followed by the Havildar and the Mullah, and also on the third edition of Colonel Walker's Map of Turkistan.

It is in the valley which comes down from Tagharma Peak to Tashkurgan, where it has an altitude of 10,230 feet. It contains the Lesser Kara Kul (Lake) and also the Kizilyart Plain. Perhaps the Greater Kara Kul (Lake) may be found in it, as well as the headwaters of the Kashgar River, if not those of the Yamunyar and the Shah-naz, alluded to by Mr. Shaw. We are thus led up to the passes at the head of the Great Alai, and also to the Terek Pass at the head of the valleys that descend to the Sir Daria. This is indicated as a suggestion to future explorers.

The heights on the western side of this elevated valley appear to be already laid down on the maps previously quoted in a manner that warrants us in giving some account of them. They form at least for a considerable distance the water-parting between the Basins of the Oxus and the Tarim or Lake Lob. Their altitude is so far only defined at the Neza Tash Pass, where it is 14,915 feet. They are indeed the prolongation of the Karakoram Range, but we prefer to give them another name; and in deference to the great authority of Alexander Humboldt, who may be justly said to have been their sponsor long ago, that name should be the Bolor Mountains. If we attempted to follow them out to their northern extremity, they would land us in the range that bounds the Great Alai, where we are content to leave them.

Between the parallel ranges of Bolor and Khoja Mohamed, is the vast expanse which forms the summer pastures of Pamir, and has a breadth of about 250 miles. Although but little known, it is at present a fertile field of geographical speculation. We may, for example, question whether the Aksu or the waters that have their rise in the Little Pamir proceed, by the circular course indicated by Colonel Walker, to join the Oxus at Kila Wamar, or go on to the Surk-ab by a line parallel to the Bolor. We know not; but, as a suggestion, the question may be of use to an explorer, and prevent him from allowing any one-sided view to mislead him.

We have now traced out the Western extensions of the Himalayan System, in a manner which, it is hoped, will be found to reflect some light on the subject.

---

* Meaning Upper and Lower Wakhia. See Col. Walker's Map of Turkistan. Third edition.

The path has not been smooth, but we suspect that it will be found like a highway in comparison with the contrasts and utterly different structure which characterises the extensions of the system eastward.

IV.

The connection of the Himalayan System with the mountains of China is a subject upon which very little information exists, and we pursue it mainly for the purpose of promoting enquiry and the exploration of a very remarkable part of the Indian frontier.

The surveys of the Jesuits and Lamas throw no light upon altitudes, but we may depend on their delineation of the rivers in this part, especially since other parts of their work have been essentially confirmed by recent journeys to Lhasa.

In China the base of the snowy mountains, on its western frontier, is not defined with the precision which the great Plain of India gives to the base of the Himalaya, neither have trigonometrical surveys established the place and altitude of the culminating peaks. We are, however, informed by the Abbé Huc that the mountains on which snow was falling in June descend at Tatsienlu, and it will be seen that further north they separate the high plateau of the Upper Hwang Ho and Kokonor from the lower plains of China proper. An altitude of 1500 feet taken by Major Blakeston, at Pengshan, on the Yangtse River, affording a clue to the elevation of the lowlands in this part of Sz-chuen. As the Min is navigable up to Ching-tu, that city and the plain which surrounds it is not much higher, so that the Min may be considered to define that part of the base of the snowy mountains. The general level of the hills in Yunnan and Sz-chuen is reported to be about 5000 feet.

Batang is also situated in a low plain, distinguished by the warmth of its temperature from the elevated mountains around it. It was the first place where the Abbé Huc felt warm without a fire. We are thus here enabled to fix another point of the lowland; for, although Batang is surrounded by heights, it is situated on the Kincha, or Yangtse River, which descends from it to Pengshan, where the river is 1500 feet above the sea. The temperature of Batang indicates that it is not much more than 2500 feet, or 1000 feet above Pengshan. Nearly west-south-west of Batang, at a distance of about 200 miles, is Sudiyeh, on the Brahmaputra, the altitude of which is fixed by observation at 210 feet. Here we are in the plains of India, with the Himalaya stretched out east and west, and we think that some evidence has been offered in favour of the suggestion, that the heights of the Southern Chain of the Himalaya are continued by the Yunling, along the line which we have now traced, and which may also be followed in the map.

The Northern Chain of the Himalaya was crossed by Pundit Nain Singh, on his last journey, and he has enabled it to be defined as far as 92° east longitude. In this direction, following the Sanpu, it will no doubt coalesce with the Southern Chain (also crossed by him) where the Sanpu descends to the plains.

In another direction, the Northern Chain may be considered as extending from the mountains around Lake Palti to the chain on the north side of the Sanpu, and east of Lhasa. This range was crossed by the Pundit, and, before him, by the Abbé Huc. The Pundit fixed the height of the Gokhar Pass on it at 16,620 feet. Lhasa is 11,910 feet, and the Sanpu where he crossed it is 11,350 feet.

The Lhasa River divides this range from the Tangla or Gangri Mountains, on the opposite side of the valley; and we have prolonged it as the edge of a steppe as far as the Bayankara Mountains—a suggestion which seems to us to be concurrent with the aspects of the smaller streams.

In like manner, we have delineated a probable prolongation of the Gangri to the north, following a line of water-parting for a portion of the way, and then taking certain bends in the streams as indicative of their passage of a chain.

The eastern part of Tibet, between the elevated Lake Plateau and the Yunling Mountains, is probably of an entirely different character to the rest of the highlands in the central and western parts of the Himalayan System. It appears to be occupied by Sok tribes or Mongols, and is therefore called Sok Pa, or the Sok country. Sok is said to mean a pasture, and the word is considered to be the root of the classic name Scythia. The Lake Plateau is called Hor Pa, and is occupied by Turki tribes; and we believe that Hor means highland—at least, it does in some Oriental languages. These tribes represent two distinct types of the human race, namely—the red men and the yellow men, who, besides being distinguished by colour, differ remarkably in facial and lingual respects. Sok Pa is the Sokpo-huil which Mr. Hodgson rightly places on the east of Hor, but which Capt. Trotter is inclined to locate on the north of it. (*Report on Trans-Himalayan Explorations*, p. 91.)

It is, however, the features of the country itself that we feel sure will prove of the greatest interest to the scientific explorer, and particularly to the naturalist. It appears to be totally devoid of great plains or broad valleys, and to be cut up into high and narrow mountains, rising like a succession of walls and ramparts into the region of perpetual snow, and divided by valleys, ravines, gorges, and fissures of great depth, with rapid rivers rushing through them. Among the great rivers which rise in Tibet, the Indus, Sutlej, and Sanpu pass through the Himalaya in gorges divided from each other by several hundred miles. But the Salween, the Cambodia, and the Yangtse are supposed to flow in parallel gorges, for a considerable distance, within a few miles of each other, between Assam and Batang. It may well be imagined, then, for that and other reasons, that the accomplishment of the short journey of 200 miles between the Plain of Assam and Batang is one of the great *desiderata* of geographers. Mr. Cooper's failure to perform it, after two attempts, is no criterion of its practicability; and success would in all probability be followed by the general opening up of Tibet and the rest of the Chinese territories to India. We believe that it would be a great advantage to the Chinese and Tibetans if their intercourse could be carried on by way of Assam, instead of across the tremendous mountains which they now traverse.

We have just received the first volume of the magnificent work on China by Baron Richthofen. It is too late to attempt to examine his views on this subject, which, however, we can see, by a glance at his maps, is dealt with by him with a masterly hand. His work will be studied by every one who wishes to examine Himalayan geography.

Trelawney Saunders.

THE INDIA-RUBBER TREES IN BRAZIL.

(Continued from page 157 of our last number.)

Search for Plants of the Tree yielding the Balsam of Copaiba—Capivi of Commerce.—I was recommended by Mr. Markham, just before leaving, to endeavour to obtain at Pará some plants of this tree which abounds in the forests of the Amazon Valley. These balsam trees have a wide distribution, and are likewise found dispersed in the forests of Guiana and Venezuela, and in the wooded littoral districts of New Granada, especially in the States of Santa Martha, Carthagena, and Panama. In those regions different species of trees varying in size and yield furnish balsam, but all are leguminous and belong to the genus *Copaifera*. The finest sort in commerce, called by the collectors White Copaiba, is met with in the province of Pará, and is shipped from Pará and Maranham. Very large quantities are annually sent to the French market.

After protracted inquiry, I discovered that few people really knew the tree, and I was beginning to think that I might not be able to obtain any knowledge of it, when fortunately I learned where a practical Copaiba collector lived. Formerly the tree might be seen growing in places easy of access, but owing to the method of collection practised it is now comparatively rare. At present a collector must make a journey, occupying several weeks, in a canoe up some of the Amazon tributaries, or penetrate into the dense forest lying between the rivers, to find any considerable quantity of Copaiba.

It cost me three successive journeys on foot, occupying three days, before I could arrange with the collector. He was drinking a supply of cane rum (*cachass*), and he would not go anywhere until it was finished. Few occupations are so perilous and fatiguing as that of the balsam collector. Exposed daily to the drenching rains in the depths of the forest, with often an insufficiency of food, bitten by large formidable ants, and tormented unceasingly day and night by swarms of mosquitoes, his life is of a wretched description. When living under these conditions, the smallest scratch from the underwood is apt to become a sore and increase to the size of a florin in forty-eight hours. On the 17th of September I left with the lad, and joined the collector at the entrance to the forest. The path led through a dense lofty vegetation, the majority of the trees being from 80 to 100 feet in height. The extremely fertile soil was of soft white sand, 20 feet or more in depth, covered by a thick surface layer of vegetable mould, with which the sand was intermixed. Slight undulations were traversed, and three little running streams were crossed, none of which contained more than a rill of water. The land was everywhere quite mealy and dry, and was elevated at least 50 feet above the region of the *gapós* or tidal floods. Large black ants, some of which were nearly two inches in length, called by the natives *candela*, ran over the ground everywhere. The bite of this ant is quite as painful as the sting of a wasp in this country. After travelling several miles we came to a balsam tree of gigantic dimensions. The saplings had been cut down around it by a person who lived a short distance away, and who consequently was considered the owner. The tree appeared to be 80 feet in height, with a clear trunk of 50 feet. On account of the great thickness of the trunk and absence of branches, no one was able to climb it. The clearing away of the underwood admitting freely air and light had induced the tree to bear seed, which, however, was just beginning to ripen. Little perpendicular rents were observed in the bark of the trunk from 8 inches to a foot in length. From some of these which had occurred quite recently, a little balsam had exuded and flowed down the trunk. A diligent search for plants was made, and one small seedling was found by the collector which I rejected, as I doubted whether it was really a balsam plant. Without much loss of time, we continued our journey along a narrow path lined with tall grass and shrubs. At midday we came to some Copaiba trees, one of which had been tapped some years ago. It had a massive, lofty trunk and wide spreading crown, and must have borne many crops of seeds, but not one plant was to be met with. A further search beneath a number of other trees which were scattered about proved alike fruitless. The collector explained that the seeds on falling were immediately eaten up by an animal about the size of a rat. This fact fully accounted for the scarcity of seedlings. Everywhere underneath the trees a close network of little paths traversed the ground. We penetrated this day into the forest for a distance of 12 or 14 miles, and got neither plants nor seeds. I had a little fever afterwards for about a day, which, although mild, weakened me considerably. I felt that the daily exposure in the sun afterwards fed the symptoms which remained. On the 9th of October I took with me the lad, and returned to examine the Copaiba tree in fruit already noticed. A number of capsules were found beneath it, but all were empty. The ground was thickly covered with the little paths of the animal which had devoured the seeds. Whilst engaged in searching about, a gentle breeze of wind arose which, moving the branches, brought down a few seeds in the best possible condition. These were carefully gathered, and in all eighteen seeds were collected. Each little pod contains only one seed, which is coated over with a white wax-like substance possessing a delicious aroma. When this is removed, the seed is found to be black and about the size and form of a field bean. The time was at hand when I purposed to leave with the rubber plants, so as to get to England before the cold weather set in, but I resolved, if possible, to see the method of tapping the trees actually performed. This operation has not yet been accurately described by any traveller, and no scientific work or class book in the English language gives a correct account of the process, for which reason I take the liberty of recording my observations.

Early on the morning of the 13th October I proceeded to the forest, accompanied by the lad and the Copaiba collector. To each was assigned a fair travelling load, consisting of food or other necessaries; but the most prominent object was a large tin, capable of holding about forty English pints, which the collector carried on his back. We travelled by a path to a point beyond the place reached on a former occasion, and then diverged into the forest, where there was no track of any kind. Entering on a district where the trees were an amazing height, we, in a short time, came to a very large Copaiba tree. This, and a number of others, were previously known to the collector, who tapped one or two when convenient. I found he did not want the lad to see the largest of these trees, lest he might show them to others. On reaching the tree, he struck the trunk two or three blows with the handle of his axe, when a sort of hollow sound was produced. The grand, symmetrical trunk was clear of branches to a height of at least 90 feet, above which the crown spread out flatly, the slender interlaced boughs, clothed with little pinnate foliage, forming an agreeable shade from the rays of the sun. The circumference at 3 feet from the ground was 7 feet 2 inches. Several old fissures in the bark were observable, and one, which had occurred quite recently, was nearly 5 feet in length. Very little balsam had exuded. These rents are reported to be occasioned by the accumulation of oil in the tree, and that, when they happen, a loud report is heard.

The person who successfully taps a Copaiba tree must be a skilful axeman. A chamber or cavity is cut in the trunk not much broader than the axe, but sufficient to allow the workman to vary the course to the heart of the tree in such a way that he may not miss what is termed the "vein," or channel, usually met with near the centre, from which the balsam flows. The base or floor of the chamber must be carefully and neatly cut with a gentle upward slope, and it should also decline to one side, so that the balsam on issuing may run in a body until it reaches the outer edge. Below the chamber a pointed piece of bark is cut and raised, which, enveloped with a leaf, serves as a spout for conveying the balsam from the tree to the tin.

The collector commenced the work by hewing out with his axe a hole or chamber in the trunk about a foot square, at a height of 2 feet from the ground. The wood at first was white to a depth of 4 or 5 inches, when it changed to a purplish red, very much resembling a piece of old oak taken from a peat moss or bog. The whole of the interior of the tree is of this colour. When the centre appeared to be reached, I was about to remark that there was no balsam, when suddenly the collector laid down his axe, and called hastily for the tin. The balsam now came flowing in a moderate-sized, cool current, full of hundreds of little white bubbles, possessing a pearly transparency. At times the flow stopped for several minutes, when a singular gurgling noise was heard, after which followed a rush of balsam. When coming most abundantly, a pint jug would have been filled in the space of one minute. Owing to the diminished light, consequent on the thick masses of foliage overhead, I could not distinguish the "vein" in the heart of the tree; but I observed a number of fissures that appeared to radiate from the centre outwards. Whilst making these observations, I was surprised to see that the whole of the wood cut through by the axeman was bedewed with drops of balsam, and so also were the ends of the chips. This remarkable and important fact shows that every atom of wood in the tree contains a certain amount of Copaiba. The bark did not appear to possess a particle. In the course of an hour nearly one-fourth of the tin was filled. A little roof thatched with leaves was placed over it, as rain began to fall heavily. We then returned home. The collector considered the tin would be filled, and proposed to return for it in a couple of days. Although balsam may be seen slowly dropping from a tapped trunk for a month after it has been operated on, the common practice is to allow a tree, if it be good, only two or three hours to drain, and then proceed to another. Occasionally large trees are met with which, when tapped, yield little balsam. The cause of this has not been ascertained. Trees of the largest size, in good condition, will sometimes yield four "potos," equal to eighty-four English imperial pints. A collector, where trees are abundant, and with plenty of vessels, can it is said, make at the rate of 5*l.* per day.

Mr. Clough, an English missionary, in describing, in a recent work,[*] the method of collecting balsam, says that it "is obtained by making a gash in the bark of the tree, and plugging the space with cotton to absorb the juice which exudes." I will venture to state that not a drop would be obtained by this process. Nor is the practice, as stated by some, of closing the cavity cut in the tree, for a time, with clay or wax, to allow the balsam to accumulate ever resorted to. Even if tried, it would not answer, for a number of reasons. Balsam, as it comes from the tree, has a powerful, pungent fragrance, which is not particularly disagreeable, although on passing the doors of the houses where it is stored, at Pará, an odour, by no means pleasant, is experienced. Possibly some change may take place in keeping. Little, if any, care seems to be taken to preserve the commodity pure. Those who go up the rivers to collect on a large scale, take in their boats all descriptions of jars and barrels which may have been imported with liquors, grease, or any kind of article. Paraffin cans are special favourites, and so are much sought for. Most of those vessels, on being emptied, are stowed away in dusty places, uncorked and uncovered, thus affording free ingress to ants, spiders, and all classes of insects. It is urged by some that balsam precipitates all impurities, but even if this were so a better system might be adopted. As some of the seeds brought home have germinated at Kew, I may add a few remarks regarding the cultivation in India, whence a few plants should be sent when strong enough for removal. I trust care may be taken at Kew to keep this sort separate from other species cultivated there, mostly natives of the West Indies, and which, although interesting in what is termed a "botanical sense," are of no value for the production of Copaiba. The temperature required is the same as that for the Pará rubber tree, which at times is found growing beside it. Wet or marsh land must be avoided. The site should be of the best dry loam suitable for cane or coffee planting. The stock for planting will have to be obtained from seeds ripened in India, so that if a few plants can be transferred thither, they should be planted in good situations, where plenty of sunshine is admitted, in order that seed may be early produced. Seedlings may be planted tolerably thick, so as to shoot rapidly up, when they can be thinned out to proper distances.

I would not recommend the planting of these trees on a large scale, with a view to early profit, as the growth would be slower than Panama or Pará rubber trees. The return would, I think, be realised in about the same time as is the case with oak plantations. However, a few hundreds of Copaiba trees growing on a planter's estate ought to enhance the value of it. Apart from the medicinal value of Copaiba, it might be well to ascertain if it would not be equal to castor oil for lubricating machinery. The journeys relating to this work were among the most fatiguing I have experienced in these countries.

---

[*] *The Amazon, a Twelvemonth's Tour* by S. Clough.

Embarkation of the Plants.—On the 17th of October the cases containing the rubber plants were put on board the "Red Cross" steamer, 'Paraense,' which was proceeding to Liverpool, after touching at the ports of Maranham and Ceará. In the embarkation of the plants and other arrangements I had the best assistance from Mr. Green, H.B.M., Consul at this place. The Captain of the steamer, Mr. Brooking, also afforded me every facility for the care and protection of the plants during the voyage. On the 20th we came to Maranham. The entrance to the anchorage is cramped, difficult, and dangerous. A reef stretches nearly all the way across, so that a ship must go in at one end of it and back out by the same way. Much of the city is built over little low hills and steep declivities, and its extent is considerable. The population appears small in comparison to the size of the place. Many of the older dwellings, public edifices, and churches, are built with stone and lime, with massive walls, in the old Portuguese or Spanish style. The actual exports of the place are insignificant, but much produce is brought from adjacent districts and shipped here, owing to the low rate of port charges. It is curious to observe the superior varieties of plantains cultivated here and at various places on the east and west coasts of South America. These have probably all sprung from the common plantain, *Musa sapientum*, introduced by the Spaniards some time after the discovery of America, and have originated from offsets, and not from seeds. The cause of this mode of development cannot be explained, but it may be inferred that if the *Musa ensete*—first discovered by the accomplished traveller Bruce—with its leaves 14 feet long, had been planted in the same regions at an early date, varieties from it might by this time have resulted which in yield of fruit would have totally eclipsed all other sorts.

After a brief stay we sailed for Ceará, which was reached on the morning of the 25th of October. A ridge of rock here also runs across a great part of the bay, but there are two openings—one at each end—so that vessels enter in at the one and go out at the other. The greatest caution and vigilance, however, is requisite.

The city is spread gaily over the elevated sloping beach, at the head of the bay, with undulatory hills of sand on each side. The climate is comparatively dry, and, undoubtedly, the place is much healthier than Pará, although yellow fever is at times very fatal. Peculiar forms of nervous and rheumatic maladies are rather prevalent.

Examination and Collection of Seeds and Plants of Ceará Indiarubber.—On the morning of the 26th I went on shore, as I wished to gain some knowledge of the method adopted in the preparation and collection of the rubber exported from Ceará. I had to land from the ship in a *jangada*, which is a raft 12 or 14 feet in length, formed of moderately sized trunks of a tree fastened together and furnished with a mast and large sail. A piece of board, a foot in breadth and 4 feet long, is pushed down in the middle between two logs to serve as a keel. The tree selected for those rafts has a peculiarly light wood, said to be brought from Bahia or Pernambuco. With a good fair wind they are said to run sometimes at the rate of 15 knots an hour. The surf is so strong that no boat or canoe could often reach the shore safely. Even the *jangadas* are sometimes overturned, and when this happens there is a risk in getting a blow from the timbers of the raft—a danger considered greater than the sea. In the town I saw a large quantity of rubber in a merchant's store, and afterwards observed that it was freely traded in by most classes of shopkeepers. I expected to have seen the tree yielding it somewhere near, but, after travelling about over the sand hills and adjoining country for the greater part of the day, I returned to the ship completely tired. I was assured by a native, who said he knew the Pará rubber tree, and that of Ceará, that both were completely identical. But the great diversity in the climate induced me to think different, and so I resolved to follow out the dictates of my own judgment, and not be influenced by any one until I could satisfy myself on the matter. Yet there was little time to explore, as the steamer was expected to leave in a very few days. Next morning an Indian from the interior happened to come on board the ship, and I took the opportunity of asking him the names of some of the villages and localities in the retired districts. I knew from previous travelling a good number of the Indian substantives, with their meanings, and this, together with further conversation, enabled me to form some idea of the character of the region where the rubber was collected. A single line of rail, formed to facilitate the transport of sugar and cotton, runs from Ceará into the interior to a place called Pacatuba, distant about 40 miles. Contiguous are a number of large plantations, with some slaves.

On Sunday, October 29th, I landed with the *jangada*, and proceeded through the town to the railway station. I had previously arranged with a native to accompany me, but he did not appear, so I went off alone. Leaving Ceará, a flat, parched-up region was traversed, diversified by a few undulations and moist hollows. Thorny thickets of bushes and slender trees, chiefly myrtles and legumes, overspread the country, with many groups of the carnaúba palm, *Copernicia cerifera*, rising high above the ordinary vegetation. The crowns of these palm-trees, waved about by the wind, and visible over such a wide expanse, presented an appearance extremely picturesque, whilst in the distance beyond rose a multitude of conical peaks and mountains, the whole combining to form a landscape of unsurpassing beauty. After a journey of two hours, I stopped at a little village with about a dozen thatched houses, called Maracanahú. The distance may be 30 miles from Ceará. I went to a man and boy who were standing in front of a hut, and made some proposals to them to show me the locality where the rubber trees grew. The man was advising the boy to accompany me, who seemed rather reluctant, when a poor lad who had lost an arm came up, and at once consented to go with me. It was fortunate I met with this one-armed lad, as I could hardly have succeeded so well with any one else. I told him I wanted first to see trees that were being wrought, because I wished to make sure of the tree, and also observe the method of collection. We proceeded along a dusty path for some distance, at times running, as I proposed, if possible, to return with the train which passed the village in the evening. Plantation establishments were seen, dispersed at wide intervals over the country. Cultivation was only carried on in very low, moist situations, or where the water during the rains was stored up in artificial ponds for irrigation. Some of these were so large that at first I took them to be natural lakes. After travelling for some time, the lad turned from the path and dived into the forest. In a few minutes he brought me among a number of rubber trees, which had recently been bled. The general forest was tolerably high, but the sparse, small foliage did not afford much shade from the fierce rays of the sun. The soil was in places a sort of soft sandstone or gravel, which was bound up in the most extraordinary manner. Neither grass nor weeds grew among the underwood, and there was an entire absence of ferns, mosses, and other plants. I soon saw that the tree was totally different from the rubber tree of Pará, and also that it would probably thrive perfectly over a very wide extent of the drier regions of India. At first sight it much resembles in appearance a birch tree, and the surface, or epidermis of the bark comes off in the same way, in thin silvery peelings. The largest of the trees were about 50 feet in height, with trunks 9 inches to 1 foot in diameter. The crown is divided into many branches, which grow in the form of a basket. The tree is deciduous, and there were neither leaves, flowers, nor fruit to be seen. I spent some time in examining attentively the process of bleeding the trees, and then commenced to search for plants. A few were found growing in an open space, but the roots were so firm that not one could be pulled up. It seemed strange that the lad and myself, exerting all our strength, could not pull up a young seedling plant, about 2 feet high. I therefore got a pointed branch of a hard wood tree, and scraped and dug about the roots, and in this way, with very arduous work, during which I hurt and lacerated my hands, some plants were uprooted. The real difficulty was now apparent. The roots of the plants were furnished with tubers, the largest of which were the size of kidney potatoes. These tubers, although quite near the surface, adhered with such tenacity to the sandstone, or hard gravel, that most of them had to be smashed, in order to get away an uninjured portion of root with the stem. In the young state they are soft and spongy, and are seen to contain milk, but afterwards become lengthened out, and form a part of the root. With diligent search and hard labour we succeeded in collecting eighteen plants.

At the station a number of natives from Ceará gathered round the "bundle of sticks," but could not make out what they were. However, an old man from the forest district came up, and, peering through the crowd, said "Manisoba." This is the Indian name of the rubber tree, which I knew before. I got back to Ceará just before dark, and fortunately found a *jangada*, on which I boarded. Thus in one day I was fortunately able to discover the origin of a tree hitherto unknown and undescribed, yielding an important article of commerce, and at the same time resolved the mode of collection and preparation, and secured a number of plants. It is true I had no instructions regarding this Ceará rubber plant, probably because it was supposed to be the same as the Pará tree; but I thought it would be well to secure more plants, and told the owner of the *jangada* to come for me in the morning. This sort of raft was expensive: each voyage cost me three *milreis* (6s.), and I could not possibly have got one for less. The distance was only about 300 yards. Next day the sea was very rough, and three *jangadas*, one of which carried the Brazilian Government mails, were overturned in the surf. The person I arranged with came for me, and I embarked. Although I was not in the least alarmed, the size and violence of the waves completely surprised me, while the *jangada*, at full speed, went groaning through the surf, covered by 9 inches or a foot of water. I cannot help wondering that not a farthing has been spent in improving the safety of these Brazilian ports. Returning to Maracanahú, I proceeded to an adjacent house, where I was previously told I could stay. The son of the owner assisted me in obtaining a quantity of seeds—700 in all. The pods, when ripe, burst and go to pieces, and so the seeds are showered on the ground. At daybreak next day we went in search of plants. We brought a strong iron hoe, as my intentions were to take up a good number, for I did not place much confidence in the seeds, although I am glad to state they have turned out well. Our course was directed to a more distant part than I had previously visited. Shortly after entering the bush-like forest, we came on a large tract of land, covered by immense masses of grey granite, some of which might be 50 tons or more in weight. These had been broken where they lay, and were the result of a volcanic explosion. Rounded masses of the same rock also cropped out in many places. Travelling now became very difficult, as we had occasionally to scramble from one block to another on our hands and knees. Many good-sized rubber trees were growing in the interspaces between those granite masses, but no plants were seen. The situation was very dry, but no doubt some seedlings had sprung up which, owing to numerous thickets of shrubs, were not perceived. After fully an hour of tiresome exploring, I resolved to go back to the place where I got plants previously. We there succeeded in collecting a number which, with those formerly gathered, amounted in all to sixty. The handle of the hoe broke, for which reason the work was not farther prosecuted. Taking with me the seeds and plants, I returned to the steamer in the afternoon.

System practised in Bleeding or Tapping the Trees, and Collecting the Rubber.—This is an operation of a very simple description. On commencing to work the collector takes with him a stout knife, and a handful of twigs to serve as a broom. Arriving at a tree, any loose stones or dust are swept from the ground around the base, and some large leaves are laid down to receive the droppings of milk which trickle down. Some do not go to the trouble of sweeping the ground or laying down leaves, for which reason the milk adheres to sand, dust, decayed leaves, and other impurities. The outer surface of the bark of the trunk is pared or sliced off to a height of 4 or 5 feet. The milk then exudes, and runs down in many delicate, tortuous courses, some of it ultimately falling on the ground. After several days the juice becomes dry and solid, and is then pulled off in strings and rolled up in balls, or put into bags in loose masses. Only a thin paring should be taken off, just deep enough to reach the milk vessels. But this is not always attended to. Nearly every tree has been cut through the bark, and a slice taken off the wood. Decay then proceeds rapidly, and many of the trunks are hollow. In this condition the trees must yield far less milk, and many, no doubt, are broken over by the wind or wither away. Collecting is carried on during the dry season only, when rain seldom falls.

Climate and Temperature.—The flat country from Ceará running back to the mountains, in which the tree abounds, manifestly possesses a very dry, arid climate for a considerable part of the year. This is evident from the fact that mandiocca and other crops require to be irrigated. The rainy season is said to begin in November and end in May or June. Torrents of rain are then reported to fall for several days in succession, after which the weather moderates for a brief space. According to some statements there are occasional years in which hardly any rain falls. This assertion concurs with the aspect presented by the country in general. The daily temperature on board the ship ranged from 82° to 85° Fahr., but inland it is often, probably, 90°.

The localities traversed by me nowhere seemed to be elevated more than 200 feet above the sea. The situations selected for cultivation in India should possess a rather dry and sustained high temperature. In the comparatively low-lying coast country of the southern portion of the peninsula of India, including the districts of Madras, Cochin, Calicut, Cannanore, Mangalore, and Bombay, will be found many localities possessing all the conditions essential for the growth of Ceará rubber. The plant might likewise be tried in the deep tropical valleys of Assam, and, indeed, in all the parched regions of India within the limits of coffee planting. It may not be safe, at least until some experience is gained, to plant in any locality where the temperature at any time of the year falls below 50° Fahrenheit.

Propagation and Planting.—Seeds are early produced if the tree is not shaded. They should be buried in brown sand, kept pretty moist until there are indications of growth, when they may be planted out permanently. In some situations, where the ground is rough and stony, they may be sown broadcast. Meantime, I would suggest the formation of plantations by cuttings, which will take root as easily as a willow. These should be taken from the points of strong shoots, and may be one foot in length. In planting, each cutting may be put down in the soil to a depth of 6 inches. If scarce, the entire shoot may be cut into pieces, each possessing a bud, all of which will grow if covered with half an inch or so of soil. On loose, sandy soils or exhausted coffee land, plantations may be formed at little expense. Dry, hard, gravelly wastes, if found to support any kind of bush, are also suitable sites. Holes might be made in stony land with an iron jumper, and a stout cutting put into each and filled with pebbles. On bare or thinly covered portions of rock the cuttings might be laid down flat, and a little heap of stones, or any kind of *débris* about the size of a mole-hill, piled over each, care being taken that the extreme point of each cutting with a bud is left uncovered. I do not advocate planting in an entirely barren desert, but wherever there is any sort of stunted tree or scrub vegetation, with an occasional sprinkling from a monsoon shower the tree is likely to prosper. Ceará rubber occupies a good position in the market. The export has been stated to amount to 1000 tons per annum.

Arrival in England.—The steamer left Ceará on October 2nd, and arrived at Liverpool on the 22nd of November. The plants were deposited at Kew early on the morning of the 23rd. There were fully 1000 plants of Pará rubber (*Hevea Braziliensis*), in the best condition. Exclusive were the Ceará plants, all of which arrived sound, and have done well.

I have looked at the collections of dried plants in the State Herbarium at Kew, but no specimen could be found of the Ceará rubber tree. Judging from pieces of the capsules and the seeds, it would seem to belong to the same family as the Pará sort. From the fact that it has tubers attached to the roots, Professor Oliver, the Curator of the Herbarium, suggested its similarity to the Mandiocca (*Manihot*), and this, in some respects, is really the case. The tubers are probably poisonous, which, however, is a prominent feature of the *Euphorbiaceæ*, but in the form, markings, texture, and liability to rot when cut or bruised, they strikingly resemble some varieties of mandiocca.

Specimens of Indiarubber.—I have forwarded to Mr. Markham the following samples of caoutchouc:—

No. 1, prepared as follows:—An imperial pint of rubber milk was put into a tin can, previously blackened, and exposed for fully two hours to the sun, during the hottest part of the day. The lid of the can was put down close. The temperature obtained exceeded 150°, but only about the half of the milk coagulated. The mass was pressed, when a whey-like juice came from it freely. It was then put to dry.

No. 2 formed the remaining portion of the milk. It was put into a shallow tin vessel, and evaporated at 212°. Every drop of the milk coagulated. The entire produce of the pint was found to weigh ten ounces. This yield exceeds any calculation I have seen on the subject, but I did everything correctly. In the process followed with No. 1, it was probably the richest portion of the milk that thickened, as may happen in the same way with various principles obtained from vegetable structure.

Nos. 3 and 4 comprise a "biscuit" and half biscuit of rubber, prepared by the smoking process, as already described. These and the previous preparations are from trees whence the plants were obtained yielding the white variety. It abounds chiefly in the lower districts of the Amazon Valley.

No. 5. A choice sample of seasoned rubber, kindly selected for me by H.B.M. Consul, Mr. Green.

No. 6. This is a black sort of rubber, and in appearance agrees perfectly with a species described by Dr. Spruce, which he saw wrought on a tributary of the Upper Amazon. Some Pará merchants say that it is not so elastic as the white variety.

No. 7. The best kind of "Negrohead," or *Sernamby*, resulting from detached portions and droppings during the smoking operation.

No. 8. "Negrohead," or *Sernamby*, being the gatherings from tapping cups.

No. 9. A small piece of Pará rubber, prepared by the German method with alum. A few grains of finely powdered alum were thrown into a little milk and stirred, when it coagulated in less than a minute.

No. 10. "Mangaba" rubber, obtained from a shrub

(Hancornia species) growing along the southern coast of Brazil. German merchants have taught the natives to prepare it with alum. It brings a low price in the market.

No. 11. Ceará rubber of commerce, now being introduced into India.

Robert Cross.

(To be continued.)

Livingstonia.—Intelligence from Dr. Stewart and his party, at Livingstonia, on Lake Nyassa, has been received at the Cape up to the end of February 1877. The health of the party has been fairly good, and people are coming into the settlement for the sake of protection. Thus Livingstonia is becoming an anti-slavery centre. As many as twenty-two men, women, and children were rescued from slavery towards the end of last year, and brought safely to the settlement on board the little steamer 'Ilala.' The chiefs are told that any one running away to escape from being sold will be protected. In February about a hundred fugitives were being fed daily, in exchange for work at house buildings, roads, or in the fields. In the middle of February the first tusk of ivory was brought into the settlement, and bought by Mr. Cotterill for 14*l.* The first visitor arrived at Livingstonia from the Punjab, an engineer named Stewart, who had been working on the Sirhind Canal, and had received two years' furlough. He came to pass a year of it in Livingstonia as a volunteer, from interest in the enterprise and in the success of missionary work. He will be of great service as an engineer, his first undertaking being a survey over a road round the Murchison cataracts.

Mr. Henderson had established the Blantyre Mission Station at the head of the Shire navigation, about 3000 feet above the sea, in 1876. The temperature is equable, drainage good, the settlement being on a knoll, with the ground sloping away in every direction. The water supply is also good. Blantyre is about three days' march from Lake Shirwa, and two days from Pimbe, on the Upper Shire, the place to which the 'Ilala' steamer comes down from Livingstonia. The natives are reported to be peaceable and intelligent, and the country consists of hill and dale, well wooded, and bounded by lofty mountains.

Russian Travellers.—We learn from the last number of the *Russische Revue* that Colonel Prshevalsky left Korle, near Kashgar, in the beginning of November, and proceeded down the Tarim to the Lob Nor, which lies at an elevation of only 2000 feet above the sea level. On the shores of that lake he discovered the ruins of two towns, and then proceeded south to the Altyn Tag, 11,000 feet in height, where he successfully hunted wild camels. He proposes to be back at Kulja in July.

Capt. Pevtzof, last year, explored the country between the Zaisan and Guchen. He collected many specimens of natural history, and is at present engaged upon a map of North-western Mongolia.

M. Mainof started in May last for the Volga, where he will examine into the condition of the Finnish tribes.

Reviews.

—:o:—

The Sailors' Pocket Book: a Collection of Practical Rules, Notes, and Tables for the use of the Royal Navy, Mercantile Marine, and Yacht Squadrons; illustrated by Wind and Current Charts; Diagrams explaining the Law of Storms, &c. By *Captain F. D. G. Bedford, R.N.* 3rd edition. (J. Griffin & Co., Portsea, 1877.)

In the third edition of *The Sailors' Pocket Book*, Captain Bedford has once more done his best to merit the encouragement given to the work by the public. By availing himself of the assistance of Admirals Ryder, Shadwell, and Bedford; Captain J. C. Wilson; Commander H. H. Grenfell; Staff Commanders V. F. Johnson, E. H. Hills, and J. C. Richards; Chief Engineer George Tuck; Dr. D. J. Duigan; and, lastly, of Staff Commander Thomas A. Hull, who appears to have acted as chief of the staff, Captain Bedford has shown considerable generalship; and in thus uniting the intelligence of so many officers, well known in their respective circles, has proved how much we are indebted to the labours of that rarely-appreciated man, the painstaking compiler.

Each section of this third edition has been carefully revised, while some have been considerably enlarged; yet by using a superior paper the actual size has been but little increased, and it is still "a pocket book." Section II., on the Standard Compass, now contains simple instructions, showing how to place the magnets for the mechanical correction of the deviation of the compass—an important contribution in these days of iron ship-building. A few practical notes on coast and ocean piloting have been added to Section III. In these notes the author points strongly to this important fact, that "the mastery of the ocean cannot be learned on shore, but can only be acquired by a capacity for taking trouble, unremitting attention, and incessant practice on ship-board and at sea."

In Section IV. a diagram has been introduced, illustrating with singular force and simplicity the law of revolving storms. Placing side by side the track of a West Indian hurricane, and that of an Indian Ocean cyclone, the compiler has shown the sailor at a glance the different effects caused by the opposite movement of these storms in northern and southern latitudes; together with the best course to be followed in both cases by vessels encountering these destructive whirlwinds. This diagram alone is a valuable addition to the work.

The Passage tables have been revised and enlarged, and a few notes on Great Circle Sailing added, including the Astronomer-Royal's rules. The article on Tides has been considerably improved by a short but clear and comprehensive description of the tidal streams in the English Channel. Another diagram has been inserted illustrating the application of Burwood's and Davis' Azimuth tables to Sumner's method of finding the position of a ship at sea. A few remarks treating on Time as an element in the science of navigation will also be found useful to young sailors.

Yachting and boating men will derive considerable information from a perusal of Section VI. Sir Garnet Wolseley's notes on Bush-fighting improve Section VII.; while "Telegraphic Weather Intelligence," and Mr. Thomas Brassey's notes on a "Volunteer Fire Brigade" in ships, add interest to Section VIII.

In Section IX., the notes on "Timber" will be handy to sailors who may have to replace a spar; while in Section X. the latest information with regard to "Particulars of Docks abroad" has been inserted, and errors that have been discovered in the "Foreign Sea Terms and Phrases" corrected.

The Appendix contains two important notices lately issued by the Hydrographic Department on the passages between Australia and China, and on the inshore navigation between Hong Kong and the Yang-tse Kiang; also the Admiralty Circulars on the examinations at the Royal Naval College and at the Hydrographic Department. The attention of officers desirous of adding the qualifications of pilot to those of seaman and gunner s call ed especially to pages 479 to 489, wherein a few examples of the questions that may be asked under ieach section of the examination are given. By this means officers preparing to pass for pilotage are made familiar with the manner in which this inquiry into the knowledge they possess is conducted; and these few pages will tend to direct their thoughts towards those small but essential practicalities, on the thorough acquaintance with which their success as sailors must chiefly depend.

A list of the principal seaport towns in connection with the telegraph stations of the world, and a very comprehensive index, completes this valuable addition to the necessary select library of a sailor at sea. The clear and concise style of its many short and vigorous paragraphs shows that the compilation must evidently have been the result, not only of much thought and judicious selection, but also of a thorough acquaintance with many "important simplicities of a sailors' profession."

We are pleased to see that this edition is dedicated, by special permission, to the Captain of the Royal Naval Reserve; another small proof of the great interest H.R.H. the Prince of Wales takes in all matters connected with the sea.

———:o:———

Handbuch der Erdkunde, von *G. H. von Kloeden*. 3rd Band. Berlin (London, Trübner).

Kloeden's *Handbook of Geography*, of which a third edition is at present being published, enjoys a high reputation in Germany, and in some respects deservedly so. There is collected in it a vast amount of statistical information, and the accounts of the physical geography of the countries described, though very concise, are on the whole satisfactory. At the same time we feel bound to state that the work bears traces of hasty and indiscriminate compilation; that there is too much padding; and that errors of commission and omission abound in it. In the description of Brussels, the new exchange and law-courts, though probably the finest buildings of that beautiful city, are not mentioned. We have examined with some care into Herr Kloeden's description of the British Islands, and discovered there a large number of statements which will amuse those better acquainted with the subject than the author, but cannot fail to mislead the majority of his readers. In South Britain and throughout Scotland, we are told, the names of towns, villages, castles, mountains and rivers are Celtic. Falconry, dog, rat, and cock-fighting are enumerated amongst the popular sports of England, and at the latter, "estates are lost and won." The author knows nothing about any Reform Bill past subsequently to 1835; nothing about the disestablishment of the Irish Church; and describes coroners as "executive officers of the police." His notions on the "Estates" or Staende, are rather amusing. The commonalty includes the gentry and the other classes of the people. The "*gentry*" includes most educated people, viz., (1) baronets and knights; (2) younger sons of peers and baronets; (3) all members of the House of Commons and squires; (4) barristers, superior government officials, men of learning, artists, and officers of position, all of whom are eligible for the House of Commons, as well as the clergy; (5) merchants. About 250,000 families belong to the gentry.

The lower classes of the people include (1) shopkeepers, small manufacturers, mechanics, capitalists, and all other private persons not supported by manual labour; (2) farmers, a very wealthy class; (3) freeholders or yeomen, who are feudal tenants, emancipated in 1660, the feudal lord still retaining his right to hunt and fish over the lands; their number is diminishing; (4) copyholders, they have no votes, and are likewise diminishing rapidly.

From the description of London we learn that that "portion of Westminster which lies to the east of Hyde Park, contains the residences of many noblemen, the leading club-houses, fine streets, fashionable Grosvenor Square, and three modern quarters of the town usually called Tyburnia, Belgravia, and May-Fair." Her Majesty's Theatre in the Haymarket is the largest in the world, La Scala alone excepted; Phelps still delights audiences with Shakespearean performances at Sadler's Wells; and Almack's fashionable balls, "carried on by ladies of distinction," are not a thing of the past. The freedom of the city is granted to every respectable person on payment of 6*l*. 5*s*. 4*d*. These freemen pay neither tolls nor other dues throughout England; they alone can open a shop in the city, and no toll is levied upon their goods or carts at the six city gates, and, if inclined that way, he may hunt in Middlesex. The city authorities still levy a toll of 1*d*. or 2*d*. at six toll bars upon carts and merchandise not belonging to freemen.

Surely, Herr Kloeden, by consulting works of greater authority than those to which he has confined himself, and by exercising his own judgment, might have managed to write a more satisfactory account of the British institutions than the strange jumble of truth and fiction which he presents to his readers.

———:o:———

Geographie des Welthandels, von *Dr. Karl Andree*. 3rd Band (Europa), von *H. Glogan* and *M. Haushofer*. Stuttgart (London, Trübner).

Dr. Karl Andree only lived to complete the first two volumes of his *Commercial Geography*, of which the first deals with the modes of commerce, commercial highroads, and the geographical distribution of commercial products, whilst in the second are described the non-European countries. The continuation of the work was entrusted by the publishers to Herr Glogan, the Secretary of the Chamber of Commerce at Frankfort, and to Dr. M. Haushofer, of Munich. It now lies before us in its complete form; and although, owing to the procrastinating manner in which it has been published (the first volume appeared in 1867), some of the statistics are not quite up to date, it embodies a vast amount of information of permanent value and of the highest interest. The book has been written with the avowed purpose of furnishing information of interest to merchants and manufacturers, and subjects hardly touched upon in other geography books have been dealt with at full length.

———:o:———

Notes on the Colony of Victoria. By *H. H. Hayter*, Government Statist of Victoria. (Trübner, 1876.)

A really marvellous picture of the progress which a colony can make within a period of forty years from the time of its earliest settlement is presented by the *Victoria Year-Book*, or Report of the Government Statist for the Colony of Victoria. In the year 1836 it numbered a population of 224 souls; the total number in 1874 was 808,437; the public revenue was 4,106,790*l*.; the exports exceeded fifteen millions in value, and the public debt was twelve and a half millions in the same year (1874); and, last, but not least, is credit due for the excellent manner in which the Government contrive to amass statistical information on every point of interest connected with the administration and progress of this important colony.

Correspondence.

THE SCURVY THEORISTS.

To the Editor of the "Geographical Magazine."

Sir,—My experience of long voyages on board American ships, where lime-juice is not served out, confirms what has been said by Dr. Black and others on the subject of scurvy. To perform any given amount of work, a certain proportion of fuel is required of proper quality, and, in order to get the full amount of work out of it, thorough combustion is necessary.

This applied to the human being means, that to enable a man to perform a given amount of work a certain portion of nutritious food is absolutely necessary, and that the man's stomach should be able to thoroughly assimilate or consume this food. Now, it is quite evident that the lime-juice cannot by any possibility take the place of the nutritious food ; the most it can do is to help to keep the digestive organs in good working order, whereas, in some English ships, owners appear to think that, provided lime-juice is furnished, they need not pay particular attention to the quality of the provisions. And medical men, when they inquire into scurvy cases, appear to think that if salt meat is sweet it is therefore nutritious and wholesome.

By constant care and change of pickle you may keep salt provisions sweet for an indefinite time, but no more nutriment is left in them than in so much sun-dried grass (not hay). Meat that is salted down in a hot climate soon parts with its nutritious properties. Our medical men require to use their judgment a little more, and their traditions a little less.

I am myself a profound sceptic as to the merits of lime-juice in preventing scurvy, potatoes are a far better preventive.

I am, &c.,

A Captain of Twenty Years' Standing.

June 9th, 1877.

TURKISH TRIBAL NAMES.

To the Editor of the "Geographical Magazine."

Sir,—Having for some time been engaged in investigations into the ethnology of Eastern Asia at the earliest dawn of authentic history, I think I can throw light on some of the names mentioned in connection with the Turks in Mr. Howorth's letters to your journal, as likewise in his work the *History of the Mongols*.

I shall begin with the Komans (see *Geog. Mag.*, Jan. 1877). Mr. Howorth inclines to the view that the name is derived from the River Kuma. If there be any connection between the two, I should rather derive the name of the river from the tribe, more especially as, according to Mr. Howorth's authorities, the district itself came to be called Kumania, and a similar name seems to have been in existence in Pliny's time. In the *Shi King*, or "Book of Poetry" (see Legge's *Chinese Classics*, vol. iii.) we find mention of a tribe called in modern Chinese Hien-Yün, but which in the older form is Hîm-wan, whose inroads seriously threatened the existence of the kingdom of the Chows.

The Ode (II., iii. 3) describes a marauding expedition against the capital, Haou. Mr. Kopsch (*China Review*, (vol. iv. pp. 104 *et seq.*) gives from other sources the story of the capture of the capital and the virtual extinction of the power of the Chows B.C. 770. The Hîm-wans have by Chinese authors from Sz-ma T'sien downwards always been connected with the Jung or Hiung-nû, who were undoubtedly Turks, and the Shi-ki, in describing the attack on the capital, calls the hordes who took part in it the K'iün-jung, or "Dog" jung. The feudal states tributary to Chow determined to avenge the insult, and, mainly through the assistance afforded by T'sin, then rising into importance, succeeded in repulsing the Hîm-wans, and driving them back to their northern settlements. T'sin, however, in return for the service rendered, took possession of a great part of the old territory of Chow, and the restored kings had to move their capital eastward to the neighbourhood of Honan-fu.

The name Hîm-wan only occurs in the "Book of Poetry," and even there (II. i. 8) is identified with the more general appellation of the Western Jung. I am therefore disposed to look upon them as a tribe of Turkish race who, about the eighth century B.C., poured down on the old kingdom of the Chows, the power of which they broke, but, being eventually defeated by the tributary states, they changed their line of migration and marched westwards. We do not meet with them again for seventeen centuries, but when we do encounter them we find them on the extreme western flank of the Turkish migration in the south-east of modern Russia. This would tally with the early date of their attack and defeat at the hands of the Chows. They were one of the earliest of the hordes, and so would naturally be found in the forefront of the advance westward.

The second tribe to which I shall allude is that of the Karluks. Mr. Howorth places them at the beginning of his history along the flanks of the T'ien-shan. The Tso-chuen, B.C. 659, tells us, that, at that time, a Turkish tribe, denominated the Kaou-loh, inhabited the mountainous district between Shansi and Pechihli. The state of Tsin, then nearly conterminous with the present Shansi, was anxious to attack them, and an army was raised, and placed under the command of the Crown Prince. Prudential considerations prevailed to prevent the expedition having any decisive results, and the Tsin army was permitted to return without any important success. The word Kaou-loh, which, by restoring the juh-shing ending, becomes Kaou-lôk, is apparently to be identified with the Karluks of Mr. Howorth.

The third tribe is the Hiung-nû. Before reading Mr. Howorth's work, and, reasoning from philological grounds alone, I had already concluded that the original pronunciation of the tribal name was Kara Nûr, or Kara Nîru. The time of the decay of the Chow empire, and the rise to power of the T'sins, was marked by extensive changes in the spoken language of Northern China. On all sides there was a coalescence and an absorption of tribes of different races, and out of the mixture thus induced arose the modern language of China.

Up till about the year 430 B.C., the Turkish hordes had been designated by a character pronounced in modern Chinese "Jung," and the particular tribe referred to had been known as the Kiang or Kang-Jung. The elements of the older and more recent name are, however, similar ; Kang and Hiung point to an older Kar or Kara, while *j* and *n*, as initials, are notoriously interchangeable in Chinese dialects. Hiung-nû, or "wrangling slaves," was just such a rendering of the name of the tribe as would suit the habits of the Chinese, who to the present day are always ready to bestow opprobrious nicknames on those outside the pale of the Middle Kingdom. Occasionally the tribe was denominated the Yin Jung, *i.e.* Dark Jung, the distinguishing title being translated, in place of merely imitated.

Up to the time of seeing Mr. Howorth's book, I had rather inclined to connect the ethnic name with Turkish Niru (*strength*), than with Nur (*light*), owing to the apparent contradiction in terms of applying to the latter the distinguishing prefix Kara. The account given (pp. 37-38) of the tribal appellation Nirun, and the myth of its origin, would seem, notwithstanding the discrepancy, to point to the latter as the real origin of the title. The empire of the Hiung-nû—*i.e.* Kara Nîrus—was broken up by the Hans in the first century A.D., and the tribe had to retire to its old seats about the head waters of the Irtish. Here the old tribal name and the old tribal myths not unnaturally survived, and finally merged in the family of which Genghiz Khan was an offshoot. Whether the name suggested the myth, or the myth preceded the name, may well remain a moot point.

Thos. W. Kingsmill.

Shanghai, *April 20th*, 1877.

——:o:——

THE NAVIGATION OF THE AMU-DARYA.

To the Editor of the "Geographical Magazine."

Sir,—The question of the navigation of the Amú-Darya, as affected by the available supply of fuel to be found on its banks, is of so great importance, both in a commercial and military point of view, that I venture to annex, for the benefit of your readers, the following quotation from Alexander Burnes's *Bokhara*, which seems to throw light on the question raised by Major H. Wood, in the May number of the *Magazine*.

Though the condition of the stream and the vegetation on its banks may have changed during the forty years which have elapsed since Burnes visited it, still the authority of this distinguished explorer of Central Asia would appear to warrant the belief that the dwarf jungle *Puku*, or *Sheesham* tree grows naturally, in considerable abundance, along the banks, as the mulberry and white poplar do on its northern tributaries, and that all three might be easily cultivated, in proportion as commerce and the consequent demand may hereafter increase; much in the same way as we see the poplar and alder cultivated along the banks of the Danube, and felled in strips, at a suitable age, for the fuel of the steamers.

"The boats on the Oxus are of a superior description, though they have neither masts nor sails. They are built in the shape of a ship, with a prow at both ends, and are generally about 50 feet long and 18 broad. They would carry about 20 tons English; they are flat-bottomed, and about 4 feet deep: when afloat the gunwale is about 2½ or 3 feet above the stream, for they do not draw much more than a foot of water when laden. They are constructed of squared logs of wood, clamped with iron, each about 6 feet long, formed of a dwarf jungle tree called puku, or sheesham, which grows in great abundance on the banks of the river, and cannot be procured of greater dimensions."—Page 169.

"Below Bokhara the supply (of boats) increases, and there are about 150 boats between it and the delta, chiefly belonging to Khiva. Here they are not used as ferry-boats, but are used to transport merchandise to and from Bokhara."—Page 170.

"The number of boats on the Oxus is certainly small, since they do not amount to 200; but there is every facility for building a fleet, the supply of wood being abundant, and, fortunately, found in single trees along the river, and not growing in any particular spot. There are no cedar or pine trees brought down by the inundation, which I hold to be a conclusive proof that the mountains, from which the Oxus and its tributaries flow, are destitute of that wood. The only other trees which I saw on the river are mulberry and white poplar, which are floated down in quantities from Hissar to Charjui, and applied to the purposes of house-building."—Page 171.

"The advantages of the Oxus, both in political and commercial points of view, must be regarded as very great. The many facilities which have been enumerated point it out either as a channel of merchandise, or the route of a military expedition. Nor is it from the features of the river itself that we form such a conclusion. It is to be remembered that its banks are peopled and cultivated. It must, therefore, be viewed as a river which is navigable, and possessing great facilities for the improvement of that navigation."—Page 172.

I am, &c.,
R. E. Carr, Major 36th Regt.

——:o:——

THE AMAZONS AND ITS TRIBUTARIES.

To the Editor of the "Geographical Magazine."

Sir,—In his letter in the June number of the *Geographical Magazine*, Mr. Révy somewhat misinterprets a passage of mine (in your May number), which, however, with much fairness, he quotes before animadverting on it.

My meaning was not that the tide has a momentum up stream when the current is down, but that the momentum of the tide, *where it runs up stream*, carries it to a higher level than the high-tide level at the river-mouth, and thus affects the tidal rise as far up the river as there is any.

Mr. Révy much under-estimates the tide of the Amazons, when he compares with it, and argues to it from, the very weak tide of the River Plate. "Fitzroy," writes M. Elisée Reclus, "was the first who pointed out a region of the ocean where contrary tides maintain the surface of the water in equilibrium. This region is the estuary of the River Plate. . . . . The tides there are scarcely anything. The strong oscillations of the level that have been observed in that estuary are due almost wholly to the regular breezes, &c."[*] Whereas, "in the Amazons River, at the equinoxes (when the equatorial tide is at its maximum), during three consecutive days, bores of 12 or 15 feet high rush up the river with each high water; so that along the course of the stream, up which for 200 miles from its mouth no less than eight tide waves are simultaneously advancing, as many as five bores are sometimes at once in progress."[†] Indeed, "in the Amazons the 'bore' rises, it is said, in three successive waves, attaining together from 30 to 50 feet in height."[‡]

It is but right to quote one more passage from the work of M. Reclus:—"As to the high tide [in rivers], its shorter duration does not allow it to rise to a much higher level than that which it attains on the strands and cliffs by the ocean."[§] And his diagram shows that in the Garonne the difference is only about 4 feet. But my position is, that the tide of the Amazons, like that of the Severn, is a typical high tide, and so mentioned by every writer on physical geography, whereas that of the Garonne is not.

The really strong point of Mr. Révy—and I readily admit that it is a very strong one—is his own accurate determination of the current and inclination of the river Paraná; for it is, as he justly says, improbable that the Amazons should have a greater inclination than the Paraná. It is very fair to set this against the barometrical determination of the height of Manáos; but not to depreciate or "drop" a result obtained from about 9000 observations, because three other observers (from some half-dozen observations in all) have obtained results widely differing from it and from each other.

In the equatorial region barometrical determinations of height admit, I think, with safety of limits rather less strict than Mr. Révy lays down; but it would lengthen my already long letter too much to discuss this question.

---

[*] M. Elisée Reclus, *The Ocean* (Woodward's translation), vol. i. p. 111.

[†] Sir J. Herschel, *Physical Geography*, §. 75.

[‡] *The Ocean*, vol. i. p. 120.

[§] *Ibid*, vol. i. p. 123.

I am, &c.,
W. CHANDLESS.

———:o:———

INDIAN FAMINE TAXES.

To the Editor of the "GEOGRAPHICAL MAGAZINE."

SIR,—You have been good enough to allude to me, in the *Geographical Magazine* for May, as administrator of the famine in Sholapoor, 1833-4. Will you allow me to point out that the condition of rulers and ruled were not then as they now are. We held a much closer connection with the traders, and they were more ready to accept responsibility. The system of taxation of Mahratta rule was still in practice. All inhabitants (not cultivators) were liable to pay Ghur Puttee—house tax; Oodeern Puttee—occupation tax; Kusub Veera—business cess; and Mohturfa—trade tax. All classes were liable to the *Dherun Puttee*, or Famine tax; but this was never levied under our rule in the Poona division of the Deccan, and I do not know if it was on the list of taxes elsewhere. These taxes, and many others, were reported on by me in 1834-5. Those in the city of Poona were commented on by me, and finished by Mr.—now Sir Bartle—Frere. In reporting I suggested that the objectionable taxes should be retained on the books, as times might come when they would be required. Mr. Williamson (afterwards Ramsay), our Revenue Commissioner, thought otherwise,—advising the Government to remit them, with a promise of never using them again. This was effected in 1836.

We were in another position in those days: officers in charge of districts took responsibility on themselves. Famine labour was unskilled; I had no supervision available for new work; I was forced to employ it on such work as it could perform, under such supervision as I had. I was Revenue Officer, Magistrate, Police Officer, Superintendent of Public Works, &c. Village walls and cleaning out tanks were the only works on which I could utilise the famine labour with any economy; I gave no wages, but organised a system of rations variable with weekly prices, and notified to all. The acceptance of this ration was all the proof of *bonâ-fide* want that I required; I had no time to waste on inquiries,—daily labour and daily food was a sufficient test. It does not now seem as if officers in charge of districts acted on their own authority; so that if the Government can supply sufficient superintendence, and if economy is of no consequence, unskilled labour can be used on works requiring skill, and wages can be given instead of rations. The labour of distribution of the latter fell on the shopkeeper; that of the wages falls on the poorly paid Government servant!

I am glad to see that you, Sir, advise a famine code; is it not strange that this has never yet been digested?

Yours, &c.,
H. P. MALET.

The Scientific Club of Vienna.—We are in receipt of the first annual report of the "Wissenschaftliche Club," founded at Vienna in April 1876, which has found a suitable home in the house belonging to the Society of Architects and Engineers. The club already numbers over 600 members, and its programme promises instruction as well as amusement. It includes popular and scientific lectures, the formation of a library, a reading-room supplied with nearly 300 periodicals, scientific excursions, and social meetings.

Proceedings of Geographical Societies.

———:o:———

ROYAL GEOGRAPHICAL SOCIETY.

Meeting of 14th May, 1877.

PUNDIT NAIN SINGH'S JOURNEY IN GREAT TIBET, FROM LEH, IN LADAKH, TO LHASA, AND HIS RETURN TO INDIA *viâ* ASSAM.*

SIR RUTHERFORD ALCOCK, President, on taking the chair, explained that Captain H. Trotter's paper on Explorations in Eastern and Western Turkistan was of a more limited scope than intended, owing to Capt. Trotter being called to accompany Sir Arnold Kemball to the seat of war in Asia Minor. The paper of the evening was thus restricted to an account of Pundit Nain Singh's journey across Tibet in 1874-75.

The Pundit, with three servants, left Leh, on his final and most important journey, on the 15th July 1874. His progress was slow, as all the baggage had to be carried by sheep, which generally carry loads of from 20 to 25 lbs. The route lay first through the northern portion of Western Tibet, or Nari, and thence along a wide grassy valley, abounding in wild asses, antelopes, and gigantic sheep, and inhabited by the Kampas, a tribe which emigrated from Eastern Tibet about a quarter of a century ago. On September 17th the gold fields of Thok-Daurakpa were reached, which, with two smaller ones further east, yield 8000*l*. per annum. For many marches beyond, the snowy peaks of the northern Himalaya (Gang-dis-ri) Range were plainly discernible for 180 miles. No cultivation was to be seen along the Pundit's route for a distance of 74 marches, between Chabuk Zinga and Lhasa, except in the district of Ombo, the elevation of which is 15,240 feet. There is a tradition that many centuries ago a great king (Gyalpo) lived at Ombo, and reigned over the whole of the Hor country. Thence to the great Tengri Nor, or Namchu Lake, the drainage was from the mountains separating the plateau from the valley of the Brahmaputra, to the north, into a vast system of land-locked lakes, discovered by the Pundit, two of which are 40 miles long. The Pundit reached Lhasa on November 18. He only stayed two days, for fear of detection, and, after visiting the ancient monastery of Samayegonpa—where the images are of pure gold and there is a large Buddhist library—he continued his course for two days down the Brahmaputra, and crossed it at the lowest known point on its upper course, where it is 500 yards wide and 20 feet deep, with a sluggish current. At Chetang, a large town on the right bank, he learned that the river flowed eastward for 30 miles, and then turned south-east. He ascended the Yelung, a tributary of the Brahmaputra, and crossed the central Himalaya at the Karkang-la Pass, 16,210 feet above the sea. At Chona-jong there is a great exchange mart, where the Tibetan merchants meet those from Assam. After being detained in Tawang for some months, the Pundit eventually reached Odalguri, in Assam, on March 1, 1875. This exploration has yielded rich and valuable results—a route survey of 1319 miles of previously unknown country; 276 latitude and 497 height observations; a system of numerous lakes and rivers has been discovered; the great snowy Gang-dis-ri Range has been proved to exist; 30 miles of the Brahmaputra have been discovered; and the Tawang route from Tibet to India has been surveyed.

The PRESIDENT said that this last journey of Pundit Nain Singh was of special interest at the present time, because the English Minister at Pekin, in his recent convention with China, had stipulated that there should be a right of travel from China across Tibet into India, opening up the very route which Nain Singh had traversed. Every part of Central Asia was becoming daily of more interest, politically, and even commercially. Such journeys as that which the Pundit had accomplished were full of peril and wasteful of human life, and therefore the Pundit was entitled to great praise.

---

* For a more detailed account of the Pundit's last journey, see our number for June 1876; see also the map facing page 173 of our present number.

Colonel H. YULE said, although he had not himself been in Tibet, he was in a similar position to every one present. Some few Europeans might have got, as it were, upon the margin of the region, but in the course of many centuries very few had actually entered on the great plateau. If only the journey of the Pundit from Ladak to Lhasa, which had just been described, was considered, it might seem that not much had been accomplished; but the labours of Nain Singh must be taken as a whole. This was not his first journey. In 1865-6 he made another and a more important journey of about the same length, when he visited Lhasa, and traced nearly the whole course of the great river which was generally identified with the Brahmaputra. The Pundit Nain Singh was the first who had given accuracy and substance to the map of Tibet. He had fixed the position of Lhasa and of the great river, and carried a diagonal from Ladak to Lhasa. Though Tibet had been entered at various times by European travellers, unfortunately none of them were geographers or surveyors. About the year 1660 or 1670, two Jesuit priests travelled from Suining to Lhasa, then to Kathmandu, and into India; but the account of their journey was very meagre, and they took no observations. Afterwards an Italian priest, Andrea Disderi, entered Cashmere and travelled from Ladak to Lhasa—possibly by the very route which the Pundit had described, but his journal had only recently been recovered in Italy, and had not yet been published. In the last century a Dutchman, Vanderput, travelled from India through Lhasa to China, and back again the same way, but had left hardly any record of his journey, and that little would have been totally unknown but for the exertions of Mr. Markham when compiling his book on Tibet. The next journey was by Bogle to the north of the Sanpu; and, forty years later, Mr. Manning reached Tibet. Why he went there it was difficult to understand, even from his own journal, but he did get there, and was arrested and sent back again. The next account was that of Huc and Gabet. They also were not geographers, and they added almost nothing to the geographical knowledge of the regions, though the book which the Abbé Huc published was one of the most amusing that ever was written. It therefore remained for the Pundit Nain Singh to give an accurate basis for the maps of Tibet. That was the great achievement which he had accomplished with very much toil, and with the sacrifice of his own health, and which was the great reason why the Geographical Society had awarded him their Gold Medal.

Sir HENRY RAWLINSON said he was particularly glad to attend on the present occasion, because, independently of the interest which, in common with all geographers, he took in the discovery of previously unknown tracts of Central Asia, he had a personal interest in the Pundit's journeys. Ten years ago, when Colonel Montgomerie brought the first journey of the Pundit before the notice of the Society, he was the means of obtaining from the Council of the Geographical Society the presentation of a gold watch to the Pundit, in recognition of his valuable services to the cause of Geography. He had, therefore, always felt that he was to a certain degree sponsor for the Pundit in his geographical work. He had always followed the Pundit's work with deep and ever-increasing interest, and he was delighted to find that his career had now culminated in his carrying off the blue ribbon of geographical science—the Gold Medal of the Royal Geographical Society. But while he gave every possible credit to the Pundit for his perseverance, his gallantry, and his skill, he could not forget the claims to consideration of the Department of the public service which founded the school to which the Pundit belonged. It was found to be a crying want in the geographical researches of India that Europeans were unable to penetrate into those countries which lay on the north and north-western frontier, and it occurred to the heads of the Department of the Trigonometrical Survey that it would be desirable to found a school for the purpose of promoting discovery by native agents. It was a very difficult task to commence with, but, by degrees, the Department succeeded in training both Muhammadans and Hindus for the purpose of exploration; and he had always felt that great credit was due to those officers, especially to Colonel Walker, the head of the Trigonometrical Survey; Colonel Montgomerie, who really founded the school of native explorers; and Captain Trotter, who not only completed the work of his predecessors, but also utilised the results which they had obtained. Such men as the Pundit, the Havildar, and the Mullah were invaluable in traversing unknown countries, where Europeans were unable to show their faces. They collected facts, recorded distances, and made observations for altitude and latitude: none of them had, however, as yet been able to determine a longitude. The taking of a lunar appeared to be beyond the power of any native surveyor. The longitudes had been arrived at by cross routes and dead reckonings, so that the position of Lhasa had not yet been scientifically ascertained. The latitude was determined by the Pundit on his former visit in 1865, when he spent three months there. Great credit was due to the officers who had sent out these native explorers, and on their return had tabulated their observations and memoranda.

The PRESIDENT said he had hoped that Sir Douglas Forsyth would have been able to attend the meeting, but a letter had been received from that gentleman stating that he was suffering from a serious cold, and could not be present. He had, however, written a few observations, pointing out that Nain Singh had been one of his own *employés*, and was engaged in carrying out a system of exploration which Captain Trotter designed.

Mr. DELMAR MORGAN and Mr. TRELAWNEY SAUNDERS also took part in the discussion.

Anniversary Meeting, 28th May, 1877.

THE meeting was held in the theatre of the University of London, Sir RUTHERFORD ALCOCK in the chair.

After the reading of the Report of the Council, the PRESIDENT proceeded with the presentation of the awards. The Founders' Medal was awarded to Captain Sir George Nares, for having commanded the Arctic Expedition of 1875-76, during which the ships and sledge-parties respectively reached a higher northern latitude than had previously been attained, and a survey was accomplished of 300 miles of coast line, facing a previously unknown Polar Sea; also for his geographical services in command of the 'Challenger' Expedition.

In returning thanks for the gift, Sir George said that he accepted it as a token that the work he had performed had met with the approval of so distinguished a body as the Royal Geographical Society, and that it would henceforward be his endeavour to bear worthily the very high distinction which had been conferred upon him.

The Victoria or Patron's Medal was awarded to Pundit Nain Singh, for his great journeys and surveys in Tibet and along the Upper Brahmaputra, during which he had determined the position of Lhasa, and added largely to our positive knowledge of the Map of Asia. In the absence from this country of Pundit

Nain Singh, Colonel H. Yule, C.B., was called upon to receive the Medal on behalf of the Pundit, and in doing so he said that the man who beyond all others ought to have occupied the position of recipient was Colonel Montgomerie, and he was sure that nothing but ill health could have caused that gentleman to be absent on an occasion so interesting to him. Not only had Colonol Montgomerie given Nain Singh the most essential part of his training, but he was himself one of the most distinguished Himalayan explorers and surveyors. He should, therefore, by the leave of the Society, communicate the Medal through Colonel Montgomerie. Colonel Yule affirmed that the observations of the Pundit had added a larger amount of important knowledge to the map of Asia than those of any other living man, and his journals formed an exceedingly interesting book of travels.

A Gold Watch was next presented to Captain A. H. Markham, R.N., for having commanded the Northern Division of Sledges in the late Arctic Expedition, in the course of which he planted the Union Jack in 83° 20′ 26″ N., a higher latitude than had ever been reached by any previous Expedition. In expressing thanks for the honour conferred upon him, Captain Markham said that though he had been selected as the recipient of the more substantial part of the honour, he knew it would be appreciated by his companions, without whom he should not be placed in the position he then occupied. He could not help thinking also, that apart from his having planted the Union Jack in the highest Northern latitude yet reached, he had been selected for this honour because he was the senior officer of the sledging parties of the Expedition, and he should regard it as an acknowledgment on the part of the Royal Geographical Society of all the services which those parties had rendered.

The annual Prize Medals offered by the Society to the Public Schools were awarded as follows :—

Physical Geography.—*Gold Medal.*—Walter New, Dulwich College. *Bronze Medal.*—Arthur Smyth Flower, Winchester College. *Honourably Mentioned.*—John Chisman, City of London School; J. A. Robinson, Liverpool College ; Frank Stanton Carey, Bristol Grammar School.

Political Geography.—*Gold Medal.*—William John Newton, Liverpool College. *Bronze Medal.*—John Wilkie, Liverpool College. *Honourably Mentioned.*—Arthur Reed Ropes, City of London School; William Wallis Ord, Dulwich College; Samuel Fowler Blackwell, Clifton College ; George Arnold Tomkinson, Haileybury College ; Henry Colthurst Godwin, Clifton College.

The awards having been presented, the PRESIDENT next proceeded with his Annual Address, at the conclusion of which a vote of thanks was proposed by Mr. F. Galton, and seconded by General Strachey, which was unanimously agreed to.

Meeting of June 12th, 1877.

SIR RUTHERFORD ALCOCK. President, in the chair. The paper of the evening "On Journeys up the Niger and Notes on the Neighbouring Countries," by Bishop Crowther, was read by Mr. Hutchinson, Secretary of the Church Missionary Society. The paper described the bishop's journeys between 1841 and 1871 in Western Africa and along the basin of the Niger, the villages of the natives, and the different tribes scattered about the neighbouring countries. The actual extent of the delta of the river was still uncertain. It was a vast tract of marshy country, with a coast line of 120 to 150 miles in width, and there was little doubt that the affluents of the river on the south bank, if traced to their source, would lead to a rich field of discovery. By some short cut the Akpah tribes of the Adamawa had already found their way down to Fernando Po. In the course of a journey of 700 miles, Bishop Crowther had met with no less than thirteen different tribes, all speaking different languages, and some of them had evidently come down the Niger from remote distances either accompanying Muhammadan conquests, or in search of trade. The Housas were a most widespread tribe, and were met with between Cape Coast and Sierra Leone. Their language, which the bishop describes as beautiful, is understood by all the Muhammadans of the country. The other important language of that part of Africa was the Fulah. Trade routes of some importance meet the Egga on the Niger, the chief of which came from Tripoli across the Sahara, whence European goods were conveyed on the backs of camels, and were distributed in the neighbouring countries. One of the caravans which the bishop had met had two camels marked with the broad arrow, and he understood that they had belonged to the English Government at the time of the Abyssinian Expedition. It was the bishop's opinion that the good feeling of the rulers of the country towards the English was such as to afford opportunity for the introduction of British commerce.

After the reading of the paper, BISHOP CROWTHER said that he was certain that what had been done in that country to lead to that good feeling was the work of the Church missionaries. The Muhammadans had carried civilization among the tribes, and the people would have profited much more if the Muhammadans had carried charity with their teaching. But they were very oppressive. Their object was not so much to make proselytes as to annex territory. The moral influence of England was great among the tribes, and principally great because her work in the repression of the slave trade was known. The shiploads of poor men and women she had set free, and had carried back to their own country and to their own homes, had done more to make the name of England known among the tribes than any expedition could. An Englishman could now travel up the Niger and be received everywhere, and the natives would be responsible for his safety.

Mr. HUTCHINSON then gave a short account of the work done by the Church Missionary Society in Central Africa, and remarked that in the last expedition a party travelling to the Lake Victoria Nyanza, had passed over the same ground as that taken by Mr. Stanley, where, it appeared, there had been so much "unfortunate bloodshed." But the party had met with no hindrance, travelling was of the easiest, and the natives most friendly. The Society had now resolved to send out a small steamer, drawing only 3 feet of water, to push further into the interior, and afford assistance to Bishop Crowther to carry the missionary work more completely among the natives.

—:o:—

PARIS GEOGRAPHICAL SOCIETY.

May 2nd, 1877.—M. LEVASSEUR in the chair. The Meeting was attended by the Emperor of the Brazils.

M. E. BOSSERE communicated the results of soundings made by Captain Exmelin, of the 'France,' on the eastern coast of Patagonia, and on the western coast of Nicaragua.

M. MESSEDAGHA, of Cairo, informed the Society that he had made a trigonometrical survey of Coele-Syria, on a scale of 1 : 200,000. This map was accompanied by a memoir, treating on the history, the physical geography, the statistics, and the archæology of the country. Several ancient monuments had been discovered by him, including the temple of Aelius Adrianus, dedicated to Diana, and the tomb of Lysimacus, the famous general of Alexander. This tomb stood on a hill in the Anti-Lebanus, and could be reached only by means of ropes. He had not succeeded in removing the slab which covered the sarcophagus, for want of suitable tools. Within the niche occupied by the sarcophagus was to be seen a medallion of the general, with a Greek inscription referring to him. He had likewise discovered the tomb of Cassius Arianus, one of Julius Cæsar's generals.

M. UJFALVY, in a letter dated Turkistan, 7th March, informs the Society that he has visited the ruins of Janekend, where he discovered enamelled bricks and coins. Yanikurgan, Sauran, and Kash-Mizgil yielded but little, but at Turkistan he secured several interesting remains of pottery and other articles. M. Ujfalvy is accompanied by his wife.

Commandant PERIER rendered an account of the geodesical operations carried on in France and Algeria, for the purpose of measuring a degree of the meridian.

LYONS GEOGRAPHICAL SOCIETY.

COLONEL CHAMPANHET read a paper on Central African Railways, with special reference to the project published by Rohlfs, in the *Mittheilungen*. The realization of this project, he thought, would offer no advantages whatever to France, but was in reality conceived for the sole interest of Germany, who would, no doubt, like to "purchase" the Vilayet of Tripoli, with a view to its colonization and exploration. A railway from Algeria to Timbuktu certainly deserved the preference, as far as France was concerned. The English, it was said, desired to found an empire in Western Africa, with the view of attracting to it the commerce of the Sudan, whilst the Egyptians were pushing their railways into the heart of the continent. France must not remain impassive under the circumstances, and the Saharan railroad to Timbuktu and the mouth of the Senegal ought to be taken in hand without delay.

LISBON GEOGRAPHICAL SOCIETY.

March 27th, 1877.—The Portuguese Committee for the exploration and civilisation of Africa was elected, Viscount de S. Januario is its president, Dr. B. du Bocage and A. A. Teixeira de Vasconcellos, Viscount Soares Franca and Comdt. F. O. Chamico are the vice-presidents, and MM. L. Cordeiro and R. A. Pequito the secretaries. A national subscription is to be started immediately. The committee propose to support Portuguese travellers, and, more especially, M. J. d'Anchietta, the Naturalist.

May 1st, 1877.—The reform of geographical teaching in schools formed the subject of discussion. The school books approved by the Board of Public Education were described as wretched productions. In one of them a mountain was said to be a "great elevation of the land," and a hill as a "little mountain." In describing the aurora borealis, the author added that this phenomenon was said to have been observed also in the Southern hemisphere, but that he doubted this.

DR. RIBEIRA read a paper on the sanitary condition of Africa, with reference to exploratory expeditions.

M. L. CORDEIRO reported on the excavations made by Dr. Martins Sarmiento at S. Romao de Briteiros, where tradition places the Lusitanian or Celtiberian *Citania*. About forty huts and four lines of fortifications have already been laid open.

MM. SERPA PINTO, HERMENEGILDO CAPELLO, and ROBERTO IVENS, have been selected by the Portuguese Government to proceed to Africa as explorers. They will start on the 5th July for the Congo, and endeavour to reach the capital of the Muata Yanvo. Another expedition left on the 5th of May, under the leadership of M. Gorpao. Its object is to make surveys for a railway to be constructed between Loanda and Ambaca.

ITALIAN GEOGRAPHICAL SOCIETY.

May 13th, 1877.—The PRESIDENT opened the proceedings by introducing Signor CARLO PIAGGIA, the illustrious Italian traveller. Signor Comm. CORRENTI gave a short summary of Signor Piaggia's courageous expeditions into Central Africa during the years 1851-1876. He then called upon Signor MATTEUCCI to read Signor Piaggia's account of his latest visit to the Victoria Nyanza. It was a relation of considerable interest, as completing the geography, zoology, and botany of that important region.

Dr. BRUNIALTI next read some notes on other late African discoveries, referring specially to Stanley's journey to Tanganyika.

Comm. CORRENTI then read a letter from the captain of the 'Scylla,' containing news of the expedition lately sent from Italy to rejoin Antinori and his companions, stating that the former were encamped at Zeila on the 27th April, making final preparations for their departure thence for Schoa.

The PRESIDENT wound up the proceedings by offering the thanks of the meeting to Signor Piaggia, and by the proposal that the Society should confer their medal on him, which met with unanimous approval.

HAMBURG GEOGRAPHICAL SOCIETY.

May 3rd, 1877.—Dr. KIRCHENPAUER in the chair.—Dr. PECHUEL-LÖSCHE read a paper on Loango, which was illustrated by water-colour drawings made on the spot, and an anthropological collection.

Herr T. J. REPSOLD then described the Mangues of Santos, in which he had made a lengthened stay.

June 7th, 1877.—Dr. KIRCHENPAUER in the chair.—The President gave a description of the natural history collection made by members of the West Siberian Expedition, and now exhibited at Bremen.

Herr FRIEDRICHSEN reported on recent geographical publications, including Baron Richthofen's work on China, on the progress of Dr. Andreas' expedition to Persia, and on the earthquake which recently occurred at Iquique, producing an immense earthquake-wave.

Dr. FRIEDLANDER read a paper on the relations between Russia and Turkey in historical and ethnographical respects.

NOTICE.

The Office of THE GEOGRAPHICAL MAGAZINE *is at* 57 *&* 59, *Ludgate Hill, E.C.*

Manuscripts sent to the Editor cannot be returned, nor can the Editor be responsible for them.

Letters and Articles intended for insertion should be written on one side of the paper only, and must be accompanied by the name and address of the writer; not for publication, but as a mark of good faith.

The right of translation is reserved.

Annual Subscription and Postage, £1, Inland. Foreign Orders must be accompanied by P.O.O. or Cheques to include the full amount of Foreign Postage. Post Office Orders to be made payable to Messrs. Trübner & Co., 57 *&* 59, *Ludgate Hill, London, E.C.*

THE

GEOGRAPHICAL MAGAZINE.

AUGUST, 1877.

THE ARCTIC EXPEDITION.

XVII.

REFUTATION OF THE ASSERTIONS OF HOSTILE CRITICS.

IN our previous numbers we have completed our review of the labours of the Arctic explorers of 1875-76. We have told how, thanks to the consummate seamanship of Sir George Nares, the two ships were forced up the ice-laden channels leading from Smith Sound, until they crossed the threshold of the unknown region, and wintered further north than explorers had ever wintered before. We have established the fact that the autumn travelling of the 'Alert' excelled all that had ever been done previously with sledges in that season of the year. We have described the obstacles overcome by the extended parties in the spring, and the terrible hardships they encountered. We have recorded how, in spite of all difficulties, in spite even of the outbreak of scurvy, those parties achieved satisfactory results, including the discovery of 300 miles of new coast-line, and how one party reached the most northern point ever attained by any human being. We have enumerated, in detail, the admirable work of the auxiliary sledge parties;[*] and have pointed out the chief scientific results of the Expedition. We have also discussed the circumstances of the unexpected outbreak of scurvy, and indicated its true cause.[†] Finally, we have placed on permanent record the hearty welcome which the explorers received on their return, not only from members of their own profession, but from all classes of their countrymen; and the cordial appreciation with which their discoveries have been received by geographers in all parts of the world.[‡] We have, in the course of this review of the work, proved, by a comparison of facts and figures,[§] that the Arctic Expedition of 1875-76 was the most successful that ever left the shores of England, and that the amount of valuable work achieved by it, in the face of the most appalling hardships and difficulties, has never been equalled. The success of the Expedition was absolutely complete, and all that not only can be done, but that real geographers ever wished to be done, has been achieved in the direction of Smith Sound.

We now have a less agreeable duty to discharge. Before proceeding to the discussion of the next Arctic work that should be undertaken, it is necessary to place on record the story of the detractors and the backbiters. We shall have to notice the method of their attack, its utter groundlessness, and the persistency with which it has been maintained. For several months we treated it with silent contempt; but at last we came to the conclusion that constantly repeated assertions, however false, if uncontradicted, are calculated to be mischievous, although the mischief can only be temporary. We, therefore, decided upon answering every attack and exposing every erroneous statement that was published having reference to the work of the Arctic Expedition. This was done in our two articles on "Moral Scurvy,"[*] and in our examination of the Report of the Scurvy Committee.[†]

In our present article we intend to expose the whole wretched business, from beginning to end, from the first snarl that made itself heard, almost before the gallant explorers had put foot on shore, to the chorus of gratified spite which followed the publication of the Scurvy Committee's Report. It is an old story. Writers of the same stamp reviled Parry and Ross and Austin, and all the best among our former explorers. They accused David Bruce of lying, and broke the heart of Middleton. Yet the fame of the great Englishmen of previous generations remains untarnished, while the very names of those who strove to injure them are utterly forgotten. So will it be again. Our object in reviewing the unfounded accusations of hostile critics is not to gratify their thirst for notoriety, and we shall refrain from mentioning any names. Our intention is to point out, for remembrance hereafter, the sort of reception that every great explorer must count upon from a certain rancorous class of writers, the successors of Dobbs of Castle Dobbs,[‡] and of other forgotten detractors of the last century.

The discovery ships had not been two days in Portsmouth Harbour, before a letter appeared in the *Times*, in large type, asserting that the causes of the outbreak of scurvy were not far to seek, for that the pemmican was salted, and the allowance of grog for the travelling parties was doubled. Both statements were untrue; but the letter served its purpose. It was dirt, and some of it might stick. The next attack was more elaborate and persistent. It was printed in a medical publication called *The Sanitary Record;* but slips were sent round, and obtained insertion in the daily papers. It consisted of three statements, namely, that no lime-juice was sent on the sledges, that the men were expected to drag 420 lbs. each, and that the officers in charge of travelling parties neglected their instructions. All three statements were untrue. Lime-juice was taken on all sledges after the end of April; but not by parties leaving the ship in March or April, because in those months it could not have been used, as every Arctic traveller knows. Out of the twenty sledging parties which left the 'Alert,' eleven took regular daily rations of lime-juice. No man was ever called upon to drag more than 240 lbs., and that only on the first day, this weight being the same as was adopted by McClintock in 1853. As for the assertion that the officers of sledges neglected their instructions, it is a pure invention. The above answers to these three groundless assertions were published; but this had no effect, for their promulgator declared that he was possessed of special sources of information, and, with great effrontery, he continued to repeat his assertions with further embellishments. Then they were taken up by other newspapers, out of heedless ignorance, and so the dirt began to stick. Those who had accepted the statements as true were committed to them, some willingly, others not without reluctance, while the best portion of the press reserved its judgment.

---

[*] Numbers for June and July 1877.

[†] See our number for January 1877, p. 3.

[‡] Number for January 1877, p. 5, and for April 1877, p. 88.

[§] See our number for December 1876, pages 314 to 324.

[*] Numbers for April and May 1877.

[†] Number for June 1877, p. 145.

[‡] The reviler of Captain Middleton, a gallant explorer of the last century, who discovered Wager River and Repulse Bay. Sir Edward Parry afterwards fully vindicated the memory of Captain Middleton.

Now comes the worst feature of this discreditable business. The *Sanitary Record* began to print extracts from the journals of the officers who commanded sledge parties, with the object of propping up the allegations already made, and of insinuating further causes of complaint. These journals had not been published, and were still treated as confidential by the Admiralty; consequently they were obtained by the *Sanitary Record* surreptitiously, and in an improper manner. This can only have been done through the connivance of an official in the Admiralty, who was in reality instigating the attack on Sir George Nares, and using the *Sanitary Record* for that purpose. The *Standard*, one of the papers which has always taken a just view of the question, has pointed out the evident malignity of this official, and that there can be very little doubt as to his identity.

Replies to this attack, in the form it then took, were sent to the *Times*, the *Pall Mall Gazette*, and other papers. It was explained that the statements in the *Sanitary Record* to the effect that no lime-juice was taken on the sledges, that the men had to drag 420 lbs. each, and that the officers neglected their instructions, were untrue. It was also shown that the cause of the outbreak of scurvy was not the absence of lime-juice on the sledges, for the following reasons: In the first place there were cases of scurvy among men who never left the ship, or who had gone away travelling at a time when daily rations of lime-juice were regularly issued. Secondly, no extended sledge parties, in previous expeditions, ever took lime-juice, and none were disabled by scurvy. It was further pointed out that lime-juice, in the form in which it was supplied to the ships, namely in jars or bottles, could not have been used in an Arctic March or April, if it *had* been taken.

But the detractors were quite unscrupulous, and were equal to the occasion. Two leading articles appeared in the *Times*, in which it was boldly asserted that lime-juice *was* taken by extended parties in previous expeditions; and that there was no case of a man suffering from scurvy in the late Expedition who had taken lime-juice without intermission.* In vain Admirals Ommanney and Richards wrote to tell the *Times* that they never did take daily rations of lime-juice in Arctic travelling. In vain Dr. Scott assured the revilers that lime-juice was never taken on the sledges, and never wanted in the expedition of 1852-54 when the longest journeys were made. The *Sanitary Record* and its followers continued to persist in their misrepresentations, on the principle that some of their dirt would stick.

Then a further embellishment was added. It was given out that Captain Nares had disobeyed positive instructions to supply all sledge parties with daily rations of lime-juice, and that by so doing he had wilfully caused three deaths, and risked the lives of all under his command. He received no such instructions. He was supplied with many suggestions—some wise, others foolish; but all arrangements were left absolutely to his own discretion, and he very properly followed the precedents established by former experience. He did what Sir Leopold McClintock, or any other experienced Arctic traveller, would have done under the same circumstances.

The object of all this abuse was that the question might be prejudged; that those who had committed themselves to an unfavourable view might become too prejudiced to be able to weigh the evidence impartially when it became accessible. And this was the effect. The production of the evidence was too long delayed. The friends of Arctic exploration were anxious that a Committee should investigate the history of the outbreak of scurvy, in order that all new experience might be thoroughly utilised, with a view to avoiding a similar calamity in future expeditions. The revilers in the press also clamoured for a Committee, but with a very different object, namely "to satisfy the public"—in other words, to gratif their own malice, or to get their unfounded accusations confirmed.

We have already reviewed the Report of the Committee.† It is quite unnecessary to discuss th possible causes of the decisions that were arrived a It is sufficient that these decisions were in direc opposition to the body of evidence that was put on record. The evidence conclusively and finally disproved all the malignant accusations that had been made against Sir George Nares. The Report of the Committee virtually confirmed them, and consequently received unbounded praise from the detractors. The evidence was ignored, while the Report was held up as a model of wisdom and accuracy.

---

* There were three such cases, namely, those of James Shepherd in the 'Discovery,' and of George Burroughs and George Kemish in the 'Alert.' Others were attacked who, though they had been away for a few days without lime-juice, returned quite well and had no sign of scurvy until after they had resumed their daily rations of lime-juice for several days—in one case for six weeks. These were Berrie, Dominic, Stuckberry, Smith, Ellard, and Petersen. Others were attacked while away travelling, though taking full daily rations of lime-juice, namely, Captain Feilden, Lorimer, Woolley, and Frederick the Eskimo.

† See our number for June 1877, p. 145.

The Report attributed the outbreak of scurvy to the absence of lime-juice from the sledge dietaries, and declared the orders of Sir George Nares for provisioning the sledges to have been improper. The evidence proved that the absence of lime-juice was not the cause of the outbreak of scurvy, and that the arrangements of Sir George Nares were in accordance with the best former precedents.

This Report was surreptitiously and improperly supplied to the *Sanitary Record* through the same malignant agency that had originally promulgated the earlier attacks on the management of the Expedition. It was published without the evidence, or, rather, with a few garbled extracts from the evidence, and thus for a brief space the whole yelping pack of revilers was in full cry again, declaring their mis-statements to have been authoritatively confirmed.

But, in due time the evidence was presented to Parliament, and the misrepresentations which had been so long and so industriously disseminated were finally exposed. Any inquirer can now satisfy himself, by reference to the Scurvy Blue-Book and the Sledging Journals, that every single statement that has been made with a view to injuring Sir George Nares is without foundation.

It was alleged that no lime-juice was taken on the sledges. The truth is, that all sledging parties leaving the ships, after the lime-juice could be used, were supplied with daily rations of it. It was alleged that the men had to drag 420 lbs. each. The truth is, that no man ever had to drag more than 240 lbs. at the outside, and that only for the first day; until the sick men themselves had to be put on sledges. It was alleged that the officers commanding sledging parties neglected their instructions. The truth is, that they followed them with the most careful exactness. It was alleged that the pemmican was salted. The truth is, that the pemmican had no particle of salt in it. It was alleged that the allowance of rum for sledge travellers was doubled. The truth is, that the usual allowance of rum was reduced by one-half. It was alleged that the men were not properly exercised before the sledges started. The truth is, that the sledge travellers had five hours of walking exercise throughout the winter, and exercise with laden sledges every day for several weeks before starting. It was alleged that in former expeditions daily rations of lime-juice were taken on the sledges. It was proved, by the unanimous evidence of the commanders of former extended parties, that they never took daily rations of lime-juice. It was alleged that frozen lime-juice, in bottles, might have been used while travelling during an Arctic April, by thawing it between the legs when in the sleeping bags. It was proved that this was impossible in March and April, and that even in the middle of May it was barely possible. It was alleged that the reason of the outbreak of scurvy was the absence of lime-juice on the sledges. It was proved that all the Autumn sledge parties and two of the early spring parties took no lime-juice, and had no scurvy; that three men were attacked by scurvy who never left the ships, and never ceased to take lime-juice daily; and that four men were so attacked while travelling with daily rations of lime-juice. It was also proved that lime-juice, frozen in bottles, cannot be used while sledge-travelling, during an Arctic March or April. Thus the evidence taken before the Scurvy Committee conclusively and finally disproved every single statement that had been made by the revilers of the Expedition, as well as the conclusions of the Committee itself.

We now come to the most serious charge, namely, that Sir George Nares neglected positive instructions to send daily rations of lime-juice with all the sledges.

This charge is based upon the 7th paragraph of the Sailing Orders for the 'Alert,' in which the following words occur:—"You have been furnished with a memorandum from the Director-General of the Medical Department of the Navy on the subject" (of precautions to be taken for the health and comfort of officers and crew). This memorandum was forwarded by the Secretary of the Admiralty to the Commander-in-Chief at Portsmouth, with a covering letter stating that it was transmitted for the information of Captain Nares, Captain Stephenson, and the medical officers of the 'Alert' and 'Discovery.' There is nothing either in the words of paragraph 7 of the Sailing Orders, or in the covering letter forwarding the memorandum, which can justify the assertion that the Admiralty intended Captain Nares to obey the suggestions of the Director-General, as orders. They are merely said to be supplied for his information. If the phrase had been "for his information and guidance," they would have been received as instructions to be obeyed, if possible. But the Admiralty very properly omitted the word "guidance."

Sir A. Armstrong, the Medical Director-General, has since attempted to make out that his suggestions were intended to be orders, because they are mentioned in the Sailing Orders, and he assumes that all that is contained in that document must bear the character of orders. This assumption is obviously untenable, and, indeed, absurd. The Manual of the Royal Geographical Society is also mentioned in the Sailing Orders, and, according to Sir A. Armstrong, all the hints and suggestions in it also bore the character of orders. It is mere trifling to assert that any document alluded to in Sailing Orders as having been supplied to the Commander of an Expedition for his information becomes an order simply because it happens to be so mentioned. The memorandum of the Director-General was merely furnished to Captain Nares for his information, and for what it might be worth, the adoption of any of the suggestions contained in it being left entirely to his discretion. There is no ground for the assumption that this memorandum partook, in the slightest degree, of the character of an order to be obeyed.

It is, therefore, perfectly clear that the charge brought against Sir George Nares, of not having obeyed an order which did not exist, is wholly without justification. Indeed, the Board of Admiralty have since publicly admitted this to be the case, and that the "memorandum" was not supplied as an instruction, but merely for information.

The memorandum of "Suggestions and Recommendations in regard to the health of the Arctic Expedition," by Sir A. Armstrong, consists of eighteen paragraphs. It is a string of the most ordinary platitudes. Paragraph 1 states that care in the selection of men is important; 2, that it should be an object to keep them in health and vigour; 3, that they should eat two pounds of meat daily; 4, that they should drink lime-juice every day, and that tea or cocoa are preferable to spirits to work upon; 5, that they should take daily exercise; 6, that there should be a monthly medical examination; 7, that the escape of foul air should be promoted in the lower deck, and that warmth and dryness should be maintained (but there is no suggestion whatever as to how these desirable objects should be secured); 8, that hilarity and cheerfulness should be kept up; 9, that the men should be examined before sledging; 10, that medicines had better be supplied to the sledges; 11, that the use of lemon-juice should be enforced while sledging *in the same manner* as on board ship; 12, that veils or neutral-tint goggles should be used in case of snow blindness; 13, that the men should make known any casualty to their officer; 14, that the sledges should be provided with tourniquets; 15, that frostbites should be treated by gentle friction with the hand; 16, that the Director-General has sent his handbook on board; 17, also his book on *Naval Hygiene;* 18, also goggles and splints invented by Dr. Wyatt.

It will be seen that, with the exception of paragraphs 3 and 11, this memorandum consists of the simplest truisms, which might have been drawn up by the merest tyro that ever read the narrative of an Arctic voyage. There is nothing in it of which Captain Nares was not already perfectly cognisant. All such matters had been fully considered in former expeditions, and Captain Nares had carefully weighed each precedent, and decided upon every point far more fully and completely than the Director-General attempted to do in this memorandum. Sir A. Armstrong made no new suggestions except that the men should eat 2 lbs. of meat daily, which was absurd; and that (paragraph 11) "the use of lemon juice when travelling should be enforced in the same manner as already recommended for the men on board ship," which was impossible. For he tells us, it should be "mixed in a tub and drunk on deck, in presence of the officer of the watch." This is the manner in which it is to be enforced on board ship, but how it is to be enforced "in the same manner," while the men are away sledging, Sir A. Armstrong does not condescend to explain.

The fact is, that paragraph 11, like the other paragraphs, is a mere slipshod hint. But it is a hint to reverse all former experience, and to make a radical change in the well-known and nicely-balanced scale of diet for Arctic sledge parties. If any importance was really attached to this hint by Sir A. Armstrong at the time, it is quite inexcusable that he should not have fully stated his reasons for the contemplated change. He was also bound to suggest the best means of using lime-juice away sledging during an Arctic April. He knew that this had never been done before. He knew, or ought to have known, that frozen lime-juice in bottles or jars (the form in which it was supplied) could not be used. He confesses that it could not have been eaten in a frozen state. He has since suggested that it might have been mixed with the pemmican. But it is too late to make suggestions now. He ought to have explained the means of meeting all these difficulties before the Expedition sailed, if he attached so much importance to it. In not doing so he is answerable for the consequences. It has been shown, by reference to the evidence taken before the Committee, that the absence of lime-juice on the sledges was not the cause of scurvy. But if his theory had been correct, Sir A. Armstrong, and he alone, would be responsible for the outbreak.

The Committee, apart from the unfounded charge that Sir George Nares disobeyed orders, further remark that his reasons for not including daily rations of lime-juice in the dietary of the extended sledge parties were insufficient.

The reasons are not only sufficient, but conclusive. They are that, with his then knowledge and experience, Captain Nares considered the measure to be unnecessary; and that, if taken in bottles or jars (the only receptacles that were supplied) during an Arctic March or April, lime-juice could not be used.

We have placed on record this final refutation of all the attacks that have been made against the Expedition; because it will be convenient to geographers, for future reference. For more detailed refutations we would refer our readers to a pamphlet published by Messrs. Stanford, and entitled *The Arctic Expedition of* 1875-76. *A reply to its critics, by Rear-Admiral Richards, C.B., F.R.S.*; and to a second pamphlet, published by Messrs. Griffin, of Portsmouth, entitled *A Refutation of the Report of the Scurvy Committee, by Clements R. Markham, C.B., F.R.S. (Second edition, with additions)*. Sir George Nares can well afford to despise the attacks on his management of the Expedition. He has, in the face of unparalleled difficulties, successfully performed a great national service. He conducted the work entrusted to him with ability and sound judgment. He acted, as regards the lime-juice, just as Sir Leopold M'Clintock would have acted in the same circumstances; and no explorer could receive, or desire to receive, higher praise than that he worthily followed in the footsteps of that great Arctic authority.

Future commanders and officers of exploring expeditions must expect similar treatment from the same class of writers; but we trust that it will cause hereafter as little annoyance as it has done on the present occasion. From such writers, abuse is the highest compliment. Men who do their best, and do it well, may always be certain that the true feeling of the country is on their side.

THE BENGAL CYCLONE OF 1876.

The Cyclone which occasioned such enormous loss of life at the mouth of the Megna, in Lower Bengal, on the morning of the 1st November 1876, has formed the subject of an exhaustive scientific investigation by Mr. J. Elliott, M.A., Meteorological Reporter to the Government of Bengal; and the result thereof lies before us in a quarto volume of nearly 200 pages, part of which is devoted to a discussion of the Vizagapatam Cyclone of the 7th October, which, alike with the Backergunj Cyclone, marked the transition from the south-west to the north-east monsoon during the month of October 1876.

Attention has been given to the subject of cyclones in the Indian Ocean since the beginning of the present century, when Colonel Capper first broached the theory that the storms of the Indian Ocean were rotatory. Mr. Redfield and Professor Dove developed this theory, and Colonel Reid discovered the fact that the rotation of these storms in the northern hemisphere is N.W.S.E., or opposite to the direction of motion of the hands of a watch with its face upwards, and that the reverse is the case in the southern hemisphere. The indraught, or centripetal part of the motion—an important element—was discovered by Mr. Espy, of Philadelphia; and Professor Dove, who had meantime been devoting great attention to the subject of the meteorology of winds and storms, explained the opposite direction of rotation in the northern and southern hemispheres by, what he termed, the law of gyration. Professor Taylor's theory, adopted by Sir John Herschel in his work on meteorology, was that cyclones originate from an upward expansion of the air, produced by local heat, that this is followed by an indraught of air, and that the rotary motion of the earth produces spiral movement round a centre, over which a continuous upward movement of the air takes place.

The latest authorities on the subject of the Indian Ocean and Bay of Bengal cyclones are Messrs. Meldrum, Blanford, Willson, and Elliott. Messrs. Meldrum and Wilison are of opinion that they are primarily due to lateral and opposite currents of winds. Mr. Blanford's theory is given briefly in an appendix to his paper on the Winds of Northern India, and ascribes their cause to a local atmospheric depression, arising from condensation of vapour, and so causing an indraught of air to the place of origin. Mr. Elliott argues that the hypothesis of parallel winds in opposite directions fails, on dynamic grounds, to account satisfactorily for the motion and energy of so large a mass of air. He, therefore, favours a modified form of Mr. Blanford's theory, and explains his views with much clearness and apparent force of reasoning, at pages 67-69 of his present Report. The excessive evaporation, which precedes the formation of the cyclones, according to this theory, occurs on the S.E. of the bay, where there is an influx from the vast evaporating region of the Indian Ocean, in addition to the evaporation from its own surface, and gradually extends northwards with the persistence of the conditions.

The materials for determining the origin and line of advance of the Backergunj Cyclone are unusually complete. A large number of vessels were at the head of the bay, where they arrived on the 29th and 30th October, and were unable to proceed up the Hughli on account of the stormy weather then prevalent over the centre and north of the bay. The logs of these ships furnish valuable information on the advance of the eastern quadrant of the cyclone. From these it would appear that the centre of the area of depression was probably in latitude 10° N., and longitude 89° E., on the 27th October, and was then moving slowly northwards. It was in latitude 13° N., and longitude 89° E., at noon on the 29th. There was a gale, cyclonic in its character, on this day in the area of depression, but the true cyclone appears not to have acquired its full intensity until the afternoon of the 30th. Its course was, generally speaking, north, with a very slight bearing to the east, and at first (at mid-day on the 30th) advanced at the rate of about nine miles an hour, soon after quickening its rate of progress till, on reaching the islands at the mouth of the Megna, the velocity of its advance was nearly 22 miles an hour, or about 10 miles an hour above the average rate of cyclones.

The alluvial lands at the estuary of the Megna being quite flat, are peculiarly obnoxious to the ravages of a cyclone. In 1822 (6th-9th June), 1867 (1st November), and 1869 (16th May) cyclones of more or less violence visited the district of Backergunj, and in the case of the first and last they were accompanied or succeeded by disastrous inundations. The ravages of the storm and wave of last November will be better understood if a brief description of the district near the mouth of the united Ganges and Brahmaputra, and of the nature of the tidal action in the north eastern angle of the Bay of Bengal, is here given.

The Brahmaputra, which rises in the plateau of Tibet, and drains the northern watershed of the Himalayas, brings down at all times a vast volume of water, which, at the point of its passing Goalpara, has been computed to be, at its lowest ebb, 146,000 cubic feet per second, representing a mass of water covering 20 square miles to the depth of one foot per hour. The Ganges brings down an almost equal volume of water, and unites with the Brahmaputra opposite Goalpara. These are joined by the Megna and the three united streams, known locally as the Megna, after a course of 100 miles, expand into a noble estuary, studded with large islands, which form three lines, stretching north and south, between which and the mainland the river finds its way to the sea. The most westerly of these three lines is formed by the islands of Badma and Dukhin Shabazpore, separated from the mainland of Backergunj by the Tetoolia River. In the centre are the islands of Nalchira and Hattya, separated from Dakhin Shahbazpore by the Shahbazpore River, and from the third and most easterly line of islands, consisting of Sundip and Siddhi, by the Megna and the Hatliya Rivers. The Sundip Channel lies between the mainland of the Chittagong district and the third line of islands. The Shahbazpore and Megna Rivers are the chief exits for the fresh water brought down by the united streams. The Sundip Channel, on the other hand, plays the part of a waste water reservoir or side channel, and its waters are always more or less brackish. The surface rises and falls with the tide, by the amount of fresh water brought down by it.

The islands at the mouth of the Megna are all low, being merely formed by the *detritus* of the Himalyas, deposited over the area in which the tidal and the river waters wage incessant warfare, alternately displacing each other. The following account, taken from a paper given in the *Statistical Reporter* for May 1876, describes the growth and colonisation of these island accretions:—

"The fluvial and tidal action by which the district of Noakholly has been formed is still at work. New *churs* and islands appear—Dega Churs as they are called; land which is under water at high tide and is visible during the ebb. These island formations gradually emerge from the water, and as soon as they cease to be overflowed by the tide, an engagement for the land, at a nominal rent, is entered into as a venture. When the grass and bush spring up, wild men, speaking a barbarous patois, come down to pasture large herds of cattle on the young herbage, putting up sheds for the beasts, they themselves bivouacking in the open. The person who has made his venture on the land now compels the cattle-owners to pay a grazing rent at so much a head a year for their cattle, and a rent for cutting fuel is taken. In course of time, as the land becomes fit for the plough, the person settling for the land will get a man of energy, if not of substance, to take charge of the cultivation of as much land as possible, and will give him a lease for a number of years. This man, the pioneer of cultivation, and afterwards often a leader of a colony of resident cultivators, will induce non-resident ryots from the neighbouring districts to plough and sow the land, and the crops will be watched and harvested from temporary huts, and the grain carted away to their permanent holdings. As time progresses, and the land improves and the cultivation is permanently extended, ryots are induced to settle on the land and become residents. They dig large tanks for fresh water supply, and raise high mounds for foundations for their homesteads in the low country, which is intersected by numerous water-courses, and plant them round with betel, cocoa-nut, and date palms, plantains, mandar, and other trees."

The tidal wave in the Bay of Bengal advances most rapidly in the deeper and central portions. The crest of the wave which to the south of the bay is almost a straight line running north-west and south-east, between the south coast of Ceylon and the southern coast of Java. As it proceeds up the bay it becomes convex towards the shore, and, near the estuary of the Megna, encounters at an obtuse angle vast quantities of fresh water coming down the three channels referred to. The action of the two opposing masses of water is somewhat complicated. The tidal wave passes onwards slightly deflected towards the Chittagong coast, and is there deflected up the Sundip Channel. Thus, on ordinary occasions, there is an accumulation of salt water in the Sundip Channel and of fresh water in the other channels; or, in other words, a salt-water tide and a fresh-water tide.

When the tide is more than usually strong, as at full moon or under the influence of a strong S.W. wind, or when the river is heavily flooded, the opposing masses of water accumulate more rapidly, and the bore is produced. But when this occurs there are always two bores—a salt-water bore, or rush of salt water up the Sundip Channel, known as the Chittagong bore, and a fresh-water bore up the remaining channels, and called by the natives the *daula* bore. These bores, like the ordinary tidal waves, meet to the north of Siddhi, the region to the east being that of salt-water tide and bore, and that to the west that of fresh-water tide and bore. When the bore is violent, as during the equinoxes, and also when the S.W. wind is strong, it advances as a wall of water, stretching across the channels several feet high, and is so dangerous that the native boatmen will, under no circumstances, venture out into the river. Any other action in the Bay of Bengal which tends to produce a similar accumulation of sea water at the mouth of the estuary will, if sufficiently rapid and large, be accompanied by exactly similar phenomena. Hence the piled-up mass of water at the centre of the cyclone would, by its advance in the same direction as the tidal wave, necessarily produce a salt-water accumulation of water and a bore in the Sundip Channel, and a fresh-water accumulation and bore in the remaining channels.

The above explanation will make clear the phenomena of the great flood on the morning of the 1st November over the low land at the mouth of the Megna. It was due to an unusually high tidal wave, followed by the storm wave of the advancing cyclone, and was intensified by the violent north wind which prevailed from 10 P.M. to 3 A.M., and brought down the river water more rapidly than usual, and by the south-west and west winds which immediately followed, and impelled a further portion of the storm wave into the converging water area of the estuary. It was full moon on the evening of the 31st, and there was an abnormally high tide, which flooded all the low lands along the coast of the head of the bay. At Chittagong the usual tidal bore at full moon occurred about an hour and a half before high tide in the channels, and was followed by an inundation of the lower grounds of the Chittagong coast and the islands in the estuary. This inundation was a salt-water one along the Chittagong coast, and in the islands of Sundip and Siddhi, while over the low lands of the remaining islands and the Backergunj district it was of fresh water, the direction in which the water advanced in the various districts depending, of course, on their height and position with respect to the nearest water. The wind and the ordinary waves at the time were from the north and north-east; but the mass of water which caused the flood came from the south, driven by the advancing tide, and produced either a salt or fresh-water inundation, in accordance with the ordinary phenomena of high tides in the Megna, as already explained. This first inundation did but little damage to life and property. The pressure of the advancing storm wave, however, prevented the tide from ebbing, and the tidal inundation from flowing off. The storm wave, like the ordinary tidal wave, was retarded on the shallows, where it accumulated, and finally overpowered the mass of fresh water brought down by the Megna, which had been unable to find an exit seawards for the previous six or seven hours. It then rushed forward as a salt-water bore up the Sundip Channel, and as a fresh-water bore up the other channels. The account given by Mr. Porch, Officiating Magistrate of Noakholly, states that the second inundation occurred at the entrance to the estuary, or at the southern extremity of the Islands of Nalchira, Badura, and Sundip, at 3 P.M., when the vast mass of water, advancing northwards, and gradually flooding the islands to a depth varying between 10 and 45 feet, swept away houses, trees, and human beings with irresistible energy. The excessive violence of the wind from the north-east, which was a marked feature of the cyclone, undoubtedly overturned the majority of the trees, the direction in which they lay indicating the wind and not the flood direction. Except in the most exposed parts, the crops were not injured by the wind and flood; and this, combined with the independent testimony on the subject, convinces Mr. Elliott that the native accounts of huge waves, 20 and 25 feet high, must be rejected.

The phenomena of the bore certainly occurred twice, and may have occurred thrice, during the storm.

The first at 11 P.M., preceding high tide, was least violent, and covered the rice and other crops, before the wind had become very violent, in the exposed parts near the sea-shore, and thus prevented the wind from breaking down and destroying the crops, and the succeeding rushes of water from tearing them up. In Chittagong, East Sudaram, Siddhi, and Sundip, where the inundation was of salt water, the crops were almost destroyed by the action of the salt water; while the prolonged contamination of the atmosphere, due to the slowness of decomposition in salt water, the temporary deterioration of the land by saline absorption, and the subsequent origin and rapid spread of epidemics among the surviving population, occasioned much disaster.

Along the Backergunj coast, and the islands of Dukhin Shahbazpore, Badura, Manpura, and Hattiya, the inundation everywhere consisted of fresh water, except at places very near the coast, where it was very slightly brackish. The waves and inundation began at 11 P.M., and the water continued to rise till about 4 A.M., when it began to subside. The greater portion of the flood water flowed off before 8 A.M., retreating even more rapidly than it had advanced. In the Rabunbad Islands the inundation was from 30 to 45 feet deep. These islands, which are very low, and more exposed than any other of the districts at the mouth of the Megna, suffered very severely. The flood came directly from the S.W., was higher than over any other part of the wave-stricken area, and swept off 75 per cent. of the population. The Golachipa thana was protected to the east and south-east by the Rabunbad Islands, and so suffered very slightly as regards crops, though about 41 per cent. of the inhabitants were lost. In Badura and the southern portion of Dukhin Shahbazpore the wave came directly from the W. and S.W.; but at Dowlutkhan, in the former, the main body of water poured in from the upper part of the wide channel of the Shahbazpore River, coming from the N.E., as the bore and flood waters advanced with greater rapidity up the channel than over the island itself. The island of Manpura, to the S.E. of Dukhin Shahbazpore, was one of the districts that suffered most severely, the flood waters there being 40 feet deep, and carrying away 52 per cent. of the whole population.

Speaking of Noakholly Mr. Porch remarks that it will always be liable to flood by inundation, especially at the time of the equinoxes, but that a cordon of the existing tanks should be highly embanked in the same way as those higher up were embanked when the coast was many miles inland, and that this would ensure a supply of fresh water to the inhabitants in case of any future like visitations. When we consider the ravages of cholera which followed, chiefly induced by the want of good drinking water, the importance of this suggestion will be better appreciated.

At Hudrakali, east of Sundip, a man gave his experience as follows:—"It was about midnight; the sea was very high and tossing about, and coming in over the coast. I was up in a tree, and as the wind blew from the east and south-east, the water came rushing in, and with such force that I thought no place would be safe and nothing would be saved. I saw a large mass of water like the bore coming up the river as high as the tree I was on. I expected soon to be swept away by this water, but the wind suddenly came down from the north. It looked dark as it dashed against the wave, and both wind and wave stood still for a time, opposed to each other, and the wave rose up to 60 feet high and then fell back, driven by the wind, to the sea, and so I escaped."

According to the Commissioner of the Chittagong Division, the western shore of the island of Kutubdia was "strewn with the dead bodies of human beings and cattle, nearly 300 of each, while no vestige is left of any embankment, artificial or natural."

Sitakund was filled with pilgrims at the time, and, owing to the destruction of the houses, and the overcrowding consequent thereon, cholera broke out, but as they soon dispersed, the diffusion and virulence of the disease was checked. Much damage to the harvest is reported from this thana and that of Kumaria. Sundip is described as looking as if it had been on fire, the vegetation, including the large trees, seems burnt up. The port jetty at Chittagong is a complete wreck; the rice stored there was damaged to the extent of rupees 84,000, and 39,000 lbs. of tea were more or less damaged. Mr. Warden remarks that the injury and discouragement to trade and the gloom cast over the business prospects are very great, as all the preliminaries had been settled for establishing a direct trade in jute between Narainganj and Europe, *viâ* Chittagong, the trade of which had been declining during the last three years. This would doubtless have soon been followed by the addition of many, if not all, of the other products of Eastern Bengal, which are now exported to Europe by the longer and very much more expensive route of Calcutta.

The information supplied by Baboo Srinath Ghose, manager under the Court of Wards, shows that there were probably three great rushes of water during the storm, the first at 11 P.M., in advance of, and due to the tidal wave; the second between 2 A.M. and 3 A.M., preceding the arrival of the crest of the storm wave at the entrance of the estuary; the third between 4 A.M. and 5 A.M., produced by the action of the south wind pressing an additional portion of the mass of the storm wave into the confined channel of the Megna, and causing a further inundation.

Mr. Elliott's report reproduces the report of the Master Attendant of Chittagong, on the effect of the cyclone at that port, and the graphic minute of Sir Richard Temple (a brief abstract of which was given in our number for January, p. 18), on the loss of life caused by the storm in the Backergunj, Noakholly, and Chittagong districts.

The advance of the cyclone after it reached the mouth of the Megna was very brief, as its further progress inland was prevented by the Tipperah Hills, which, interposing a series of wave-like crests or elevations running north and south, presented a formidable barrier to the rotation of the wind on the N.W. quadrant, and speedily broke it up. By 10 A.M. on the morning of the 1st of November the cyclone was completely dissolved, and the only evidence of its existence was a slight barometric depression over the Tipperah Hills, Cachar, and Assam. In the centre and north of the bay there was a clear sky and smooth sea, where, from twelve to twenty-four hours before, the wind had been blowing with hurricane force, the rain falling in torrents, and the sea tossing about in the wildest confusion. At noon some twenty vessels, the majority dismasted and reduced to mere wrecks, were struggling feebly towards the nearest port, while a few scattered sheets of water on land were all that was left there to indicate that the now houseless, starving inhabitants of one of the richest and most populous districts of Bengal had been visited by a flood more destructive in its character than history has yet recorded.

The recent papers received on this subject show that the loss of life by drowning has proved, on investigation, to be much less than was originally supposed. No regular census has been taken, as it was feared that the people would consider this to be a hardship at such a time; but, from estimates, it would appear that in the three districts of Chittagong, Noakholly, and Backergunj, about 100,000 were drowned, instead of 215,000, as at first supposed. Cholera has, however, subsequently set in, and the ravages of this fearful disease, aggravated by the presence of decaying corpses, damaged food, contaminated water, and imperfect shelter, carried off no less than 75,000 in the three districts referred to by the end of March, when, thanks to the exertions of the Government officials, it was finally stamped out.

AFFAIRS IN JAPAN.

Intelligence from Japan shows very clearly that the position of the Government of that progressive and interesting country is somewhat critical. Its conduct of affairs has had the effect of producing a series of rebellious outbreaks, the participators in which are numerous and thoroughly in earnest, though their efforts have been, so far, rendered unsuccessful by the want of organisation and simultaneous action among them.

The latest movement, in Satsuma, is the most formidable which has yet occurred. The insurgents are said to be 18,000 in number, and are opposed by 20,000 Government troops. They are headed by Saigo Kichinosuke, whose fame for daring, and his ability to organise and lead troops, is unequalled in Japan. He was the chief instigator of the movement of 1867, which placed the present Government in power, and he personally conducted it to a successful termination.

The announcement made by the Japanese Embassy, that the rebellion has been wholly suppressed, should be received with extreme caution. The mountainous nature of the country in which operations are being carried on makes the attainment of any decisive advantage on either side extremely improbable; and, further, the causes of the rebellion are too deep seated and too widely felt to give any hope for its immediate suppression. If a rising is quelled in one locality it is quickly followed by one more formidable in another; and the Government will require all its power, and the firm loyalty of its present supporters—which rumour says it does not possess—to withstand such continued attacks.*

To enable a clear conception to be formed of the position of affairs, it may be convenient to describe, concisely, the political events of the last few years.

The rebellion of 1867-8 ended in the overthrow of the *Shô-gun or Taikun;* the emergence of the *Mikado* from retirement, and his taking the active control of the affairs of the Empire into his own hands. The feudal chiefs *(Daimios)*, who formerly held absolute possession of certain portions of the country, then relinquished their property and their authority to the *Mikado*, but were allowed to reside in and to administer the local affairs of their former territories. Each *Daimio* had a band of armed retainers attached to his service, who were in the receipt of certain emoluments, some in yearly payments, others in landed property. They held a rank which formed a very marked distinction between them and the merchant or labouring classes, the badge of which was the privilege of wearing two swords. They are generally known as *Samurai*, and their aggregate number is nearly two millions.

The *Mikado*, in accepting the territories of the *Daimios*, entered into engagements, first, to discharge all their liabilities, some of which were considerable, and to accomplish this a loan of 2,400,000*l.* was raised on the London market; second, to give them hereditary pensions proportioned to their former wealth and position; and third, to continue the payment of the hereditary pensions of the *Samurai*.

But he, being then a boy of twenty-two, and whose life had been passed in the closest seclusion, was unfit to exercise his powers, and two of his former councillors, named Sanjio and Iwakura, were installed as chief advisers and first and second Prime Ministers of the new Government. Its other members did not belong to the old families of the *Daimios*, but were selected, in some cases, from the lowest ranks of the *Samurai*. The part they took in the rebellion, and their general intelligence were probably what induced their election. The Government, so constituted, was regarded by the old noble families and their retainers with considerable jealousy and suspicion; but it, nevertheless, was endowed with supreme and irresponsible jurisdiction, and immediately proceeded to take steps of a more or less revolutionary character. Its action, in the introduction of Western improvements has not caused any general dissatisfaction, though the recklessness with which new schemes were entertained, and the wasteful expenditure which was incurred on them, would have been good grounds for this; but the Japanese, generally, have too high an appreciation of the advantages of the introduction of European appliances to be too easily led into any feeling against them. It is in the rapid and violent changes in the domestic relations of the people, made in a tyrannical and arbitrary spirit, that we must look for the present disturbed state of the country.

The first movement of a revolutionary character made by the Government was the recall to the capital of all the old *Daimios*, and the abstraction from them of the little remaining authority which they possessed. The country was re-divided, the old landmarks were destroyed, and new Government officials were appointed as the local authorities for each district. This step, which finally obliterated all traces of the feudal system, though looked upon as a bold one, did not at the time create any special signs of dissatisfaction.

---

* The newspapers published in Japan openly accuse the Government of not only suppressing any news favourable to the rebels, but of sending intelligence to the various embassies abroad, worded so as to convey an entirely wrong impression of the state of affairs.

Many orders of a distasteful character then emanated from the Government. The method of wearing the hair was changed, European costume became the official dress, the labouring classes were admitted to the army and navy, they were also permitted to ride on horseback, the wearing of swords by the *Samurai* was discontinued, and other class distinctions were removed.

The *Samurai*, much dissatisfied, and deserted by their former chiefs, who were either living in retirement or had gone abroad, spread themselves through the country in idle, discontented, and quarrelsome bands. But the Government, imagining its position to be sufficiently established, took a further step, which has, not unnaturally, fired the spirit of the whole class. The sum, payable annually to the *Daimios* and their retainers, on account of their pensions, causing a drain on the country's resources which seriously crippled them, the Government decided to adopt a scheme for the capitalisation of these, which was promulgated in August last. The amount of capital payable to each person is calculated on a basis of from five to ten years' purchase. Bonds, bearing interest, are given in lieu of cash, which are redeemable, by instalments, in thirty years. In this time, therefore, the Government will be entirely relieved of the obligation, while the present annual relief to the revenue is calculated at one and a half millions sterling. The position of the *Samurai*, however, is an extremely hard one. They are men unaccustomed to labour, and, in the great majority of cases, unfitted for it, who were in the possession of land, or in receipt of incomes, which they imagined were personal and permanent property. They accuse the Government of a breach of faith, of repudiating its obligations, and of interfering with the rights of property. The ancient chivalry of the class is considered as doomed. It is said, with characteristic *naïveté*—"Henceforward the national spirit of Japan will only decline. It has hitherto been preserved by the *Samurai*; but the result of the abolition of their pensions will be, that they must of necessity become farmers, merchants, or labourers, and how then can they maintain their former courage?"

In October last, a former member of the Government, and a most influential official named Mayebara, headed an insurrection in the province of *Higo*, in the island of *Kiushiu*, which spread to the neighbouring provinces of Chikuzen and Buzen, and crossed to the main island, where it convulsed Chôshin and Suwo. All this district is famous for the spirit and valour of the *Samurai*, and Mayebara had distinguished himself as an able leader in the rebellion of 1867. The Government succeeded in quelling the movement, after some slaughter on both sides, and Mayebara, with about fifty of his principal followers, were summarily executed. The present rising in Satsuma, headed by Saigo Kichinosuke, occupies, to some extent, the same ground as the former one, and surprise has been felt that Saigo did not, then, join his forces with those of Mayebara. The latest news gives some explanation of this.

Saigo Kichinosuke has been before his countrymen as a successful leader of opinion and an intrepid soldier for the last twenty years. He has, on many occasions, given proof of his patriotism and daring, and his life is full of those romantic incidents common to the wild species of warfare which was carried on in Japan in recent years. He was the Commander-in-Chief of the *Mikado's* forces before Yedo in 1868; and to him the *Shô-gun* surrendered. He afterwards held one of the highest positions in the *Mikado's* Government, but, disagreeing with the policy of his colleagues, he retired to his own country (Satsuma) in 1873, where he has since lived in seclusion. Vague and alarming rumours have since been constantly circulated regarding Saigo's proceedings. It was frequently hinted that he was devoting himself to the organisation of a movement among his clansmen against the Government. On the other hand, it was asserted that the eagerness of the Satsuma men to take arms was only restrained by the loyalty and influence of Saigo. There are evidences that the Government was kept in constant fear of this clan; for instance, an understanding was said to have been come to with its Governor that he might observe or not imperial notifications at his discretion; and it is also said that no attempt was at first made to force upon the Satsuma *Samurai* the capitalisation scheme. It exercised, therefore, a preponderating influence upon the Government, and Saigo had almost supreme control over it; and the assumption is that, as he did not league himself with Mayebara in October, he was, up to that time, loyal in his sentiments. But he was regarded with suspicion, and the cause of his now having changed into one of the fiercest opponents of the Government is shadowed forth in intelligence received lately from Japan, which tells us that a plot was laid to assassinate him, in which certain members of the Government are compromised. It being frustrated, a full confession was made by one of the men hired to carry it out. This man was employed by the Chief Superintendent of Police in Yedo—himself a Government official—and a very general belief exists—which, however, requires verification—that it was a scheme connived at by the Government as the first step towards reducing the Satsuma clan to allegiance.

But the disaffection of the *Samurai*, and the fierce hatred of one of the greatest men the country has produced, probably caused in the manner above described, are not the only forces which the Government has to contend against. There is a wide-spread discontent among the agricultural and labouring population. The farmers, who are poor, and who maintain a constant struggle to fulfil the demands made upon them for the public purse, subscribe three-fourths of the revenue of the country. The taxes from them were formerly levied in rice, but the Government recently directed that these should, in future, be paid in money. The farmers assert that the Government officials put an unfair value on the rice, and they are consequently mulcted in a larger quantity than before. A re-measurement of the farms was also recently ordered, and, as it was found that considerable additions had been made to the area of some of these, the holders became liable to additional taxation. Here, it is not a question so much of justice as one of the absolute inability of the farmers to submit to these increased imposts. In all parts of the country, risings of the agricultural population have occurred; and some, though not of a dangerous character, have led to considerable inconvenience. Quite recently the Government has, from motives of prudence, reduced the rate at which the land-tax was levied from 3 per cent. to 2½ per cent. on the value of the land. This measure has restored quiet for the time, but it has caused a reduction of nearly two millions sterling in the revenue, and necessitated wholesale reductions in various branches of the Government service.

The Government, with a most difficult task before it, has acted in a too precipitate and arbitrary manner. It has, doubtless, been actuated by motives for the further advance and prosperity of the country; but its action has been characterised by the usual Asiatic cunning and want of candour, by no consideration for the old habits and tendencies of the people, and by an almost utter disregard of the rights of an acknowledged property. The present rebellion is said to have already abstracted over two millions sterling from an almost entirely exhausted exchequer; and, by the latest news received, the Government troops have, as yet, gained no important advantage. Serious risings are occurring in other parts of the country, and the Government, even if eventually successful in quelling them, will have received a shock, both morally and financially, from which it will scarce recover. R. H. Brunton.

THE LIVINGSTONIA MISSION.

Narrative of Dr. J. Thornton Macklin.

The following interesting letters from Dr. J. Thornton Macklin and Dr. Stewart, of the Livingstonia Mission, have been forwarded to us from the Cape, by Sir Bartle Frere:—

"The site on which Blantyre Mission Station rests is an admirable one in every way, and reflects great credit on Mr. Henderson, who, it must be remembered, went out with the Free Church Party, under Mr. Young, of the Royal Navy, in 1875, for the purpose of looking round the country and finding out a suitable place where to establish our Mission. In the course of his travels Mr. Henderson came to the conclusion that the most suitable locality would be somewhere in the Shire Highlands, among the Ageneas, and, if possible, in the vicinity of Magomero, the scene of the University Mission labours. Accordingly, when our party had arrived out in 1876, and had reached Ramakukau's village, which it may be said is practically the head of the Shire navigation, though seven miles below Matili, to which place boats can reach, here Mr. Henderson left us, and went up the hill to fix definitely on a site for the settlement. I should have gone with him, but was ill with fever at the time. The carefulness and discrimination shown in the selection—the result of a long experience in Australia—clearly points out that Mr. Henderson was well worthy of the trust reposed in him, and well fitted to perform the difficult task laid upon him. A short time ago there was a village here, but it was deserted some time before we came, as the head man had been killed, it is said, by Ramakukau. He was buried in his hut, which was knocked down, and the place was left. When Mr. Henderson came he found several standing, and these he had repaired and put in order for us to dwell in until such time as we got more suitable houses built.

"Now as to the advantage of the site, and first as to its healthiness. The altitude is good, as we are upon the third plateau of the Shire Hill, which is about 3000 feet high. Thus we are high above the malarious level, not, I mean, to assert that altitude necessarily procures immunity from malaria, for even in the hills, if one chooses to settle down in a hollow or low-lying marshy place, he will probably find more than enough of the miasmatic poison developed than is conducive to health. The temperature is very suitable, being equable, rarely in the shade rising above 80°, and rarely falling below 70°. Drainage is good, and is secured by the settlement standing on a rising ground or knoll, from which the ground slopes away in every direction, so that during the rainy season no water accumulates in our immediate vicinity.

The water supply is good, both as regards quality and quantity, and it is but a short distance off. Again, almost every day a fine breeze prevails, which is cool and bracing, yet mild. I think, therefore, all things being considered, I can congratulate both ourselves and the friends of the Mission at home on the healthiness of Blantyre. Concerning the matter of cultivation, things are satisfactory. The soil is good, and already we have got a large garden, producing not only plants indigenous to the soil, but also home plants and others we got from the Cape. Now a few words as to the conveniences of the situation. We are but two days' march from Ramakukau's, thus we can have speedy access to the coast, Kongoni, or Quillimane. Again, we are within the same number of days' journey from Pimbe, on the Upper Shire, the place to which the 'Ilala,' the steamer of the Free Church party, comes down, so we are also within speedy communication with Lake Nyassa. Lake Shirwa is only three days off at the most, and from there the natives bring us very good fish. We are also only one day's journey from the Ruo; but as it flows through a bad and uninhabited country, it cannot be said to be much of an advantage in the meantime.

"*General Aspect of the Country.*—Hills and dales, all well wooded and covered with vegetation of different kinds. In some places very rank and dense indeed. I have been caught and held fast in the thicket more than once. In most parts wild flowers abound of many and varied hues, which, in the midst of the fresh green verdure that prevails, relieves it, and is very pleasing to the eye, and in some cases our sense of smell is much gratified. Our water-courses and streams are rich with vegetation of every kind and variety. Many different kinds of ferns abound; but I do not think any have yet been found that are not also to be found at home. Very fine and large trees are plentiful on the banks of the streams, too, and some good planks might be got out of them; but generally the trees which prevail over the country are low and stunted: they are principally acacias. Sometimes one emerges from the wood into fine glades covered with long waving green grass: these, in some cases, much resemble the parks in the confines of a gentleman's grounds at home. They are very picturesque. The mountains are high and steep, with many deep ravines. They are clad with verdure to the very top, from the midst of which the brown rocks may be seen lifting up their ancient weather-beaten heads, lending enchantment to the view. Here and there are large fields of corn and pumpkins flourishing, helping to relieve the wild appearance of the country. The gardens are often far away from the villages in the season, the people leaving their homes and living in temporary habitations for the purpose of cultivating them.

"The people are quiet and peaceable and well disposed. They are fond of fun and music. They are impressible, expressing great surprise and pleasure at the sight of pictures, our guns, pistols, watches, and other, to them, wonderful things. They are quick and intelligent, and pick up with a wonderful degree of alacrity what you want or mean. Their features are not at all unpleasant to look upon, and there is great variety; the expression is generally happy and comparatively intelligent. Their stature is very good, and so, too, their physique; in height, on an average, of about 5 feet 6 inches to 5 feet 8 inches. The following measurements I have taken, of which I give the average: the head, in circumference, $21\frac{3}{4}$ inches; chest, $34\frac{1}{4}$ inches; arm in length, $22\frac{1}{2}$ inches; hand, $6\frac{1}{2}$ inches. The measurement of the pelvis by a foot I have not yet ascertained, but they are well proportioned. They are lithe, supple, and active in their movements. They are a bow-and-arrow people, and distinguished from those tribes whose chief weapon is the spear, though now many of them have flint-lock muskets, which, curiously enough, are all branded 42nd Regiment, and have a crown on them. There is one thing they are very fond of doing, and that is, gathering themselves together to one place, talking and drinking 'pombe,' *i.e.*, native beer,—of course, men only; the women do not take part in these proceedings. Smoking is a common habit among them; even women and very little boys smoke, and if they would confine themselves to tobacco it would not matter much; but they have a very pernicious habit of smoking hemp and bang, which produces a kind of intoxication—a hysterical fit I should be inclined to call it; but the effect it produces, be it what it may, seems to be very pleasant, for they practise the habit most pertinaciously, though it produces a severe fit of coughing, which is most painful to hear, if not to experience. The women, like the men, are well formed, and of a good height. They seem quite contented and happy, though undoubtedly they do the most work; still, they are not in any way ill-used by the men. The features of most of the elderly women are disfigured by tattoo marks, and the hideous lip-ring, or pilele; I say the elder women, for I am happy to say that the younger women are not adopting the foolish fashion of wearing the pilele, though most undergo the tattooing operation.

"*Industries.*—These are chiefly iron manufactured into various stages, in which they have reached a considerable degree of perfection. *Basket-making.*—In this I would say they have reached perfection, but then I am not a competent judge. *Cloth Manufacture.*—In this trade their attainments are of no mean order, both as regards cloth manufactured from the bark of trees or that from cotton. Of these I will give you more details in a future letter, when I will also speak of their habits, houses, food, and other matters that may prove of interest."

The following letter is from the leader of the expedition, Dr. Stewart, to Mr. Dunn:—

"Livingstonia, Lake Nyassa,
27th February, 1877.

"Since I wrote you in December, I am glad to be able to say that things here have been going on well, nothing of any consequence of an untoward kind having occurred, while there is much to be thankful for. There have been a few cases of fever, mostly slight, and lasting only a day or two. With this exception, and that of a chronic case which improves but slowly, the health of the party is fairly good; we cannot expect, in latitude 14° in Central Africa, the robust vigour and energy we enjoy in latitude 30° or 50°.

"During the last few weeks, or since the beginning of this year, Livingstonia seems to have taken a start, and began to grow in one of the directions we specially wish it to grow—as an anti-slavery centre. There were very few people actually settled here in 1876: up to October, at least, not a dozen. Since then, some five or six parties, the smallest numbering from one or two up to twenty-two, have come seeking the protection of the English. The story of these twenty-two is this: A man arrived here in the middle of the night, in the fragments of a large canoe, in which I feel certain no white man would venture one hundred yards from the shore, yet it appears that he had been part of the two days and nights in this crazy affair. He had slept on the sand all night, and made his appearance in the station about six in the morning. He was in a woeful condition, but told his story with directness, and said he and twenty-one others were about to be sold by Inpemba, a notorious slaver on the western shore of the lake; that they saw the dhow which had come, and having got information from a friend, they fled in the night, in a large canoe, and made for an island to the north; that their canoe had got broken on the rocks as they landed, and he had come in the patched-up fragments to ask the assistance and protection of the English; that there were twenty-one men, women, and children on the island. There was not much time for delay or consideration—they had nothing to eat, and no means of getting away. We accordingly got up steam in the 'Ilala,' and, taking the fugitive for our guide, made for the island, which we reached about one o'clock. We approached it cautiously, partly on account of the rocks, and partly because I was not sure whether he might not be leading us into some trap, though I have never uttered that opinion till now; but a little doubt in such circumstances, and with new men, is wholesome. The natives saw us, though we did not first see them, as the trees come down to the water's edge. He shouted, and they replied. We sent off the boat, and shortly had all of them on board. There they certainly were—twenty-two men, women, and children. They had only a few hoes, the bows and arrows usually carried by the natives, a little maize in a calabash, and a few wild roots gathered on the island. We got up the anchor and steamed off, arriving at the station at sunset; and the Fugitive Slave Circular never crossed my mind till I sat down to write this. On the contrary, as we made rapid way homewards over the glassy lake, on a very fine afternoon, I thought the 'Ilala' was just about her proper work. It is true she is not a fighting ship, intended to burn and sink dhows, and frighten Arabs out of their skins and colour, but she is peacefully circumventing those senseless chiefs who weaken themselves by selling their people; and in many ways the steamer has been a great element in our progress and in the security of the position we have attained. Both would have been different and very much less without the steamer. Of course the slaving chiefs cannot look with friendly eyes on these doings, and two efforts have been made to get back the refugees. We have seen no occasion, except in one instance, to give them up, and the applicants have generally departed crestfallen. We tell them—if any man accused of a serious crime comes, and they show that he is guilty, we shall not receive him; but anyone running away to escape being sold, will be protected. Out of these cases some complications may yet arise of an unlooked-for kind. In the meantime we cannot do otherwise than as we are doing, even though the increasing numbers lead us into a difficulty about food till their crops are ready, and some were rather late in sowing. We have to feed about one hundred daily, and even though the ration is little over 1½ lb. of maize, we are sometimes in a strait; a ton of maize or Kafir corn does not last much more than a fortnight or three weeks. But this giving out of food is not gratuitous; all work at roads, fields, or house-building, or whatever is on hand. We have not an idler about the place, not one. The rule is simple: He who will not work for his daily maize stays not here.

"The school goes on steadily; and the daily meeting with the people, now generally held in the evening, is kept up regularly, and apparently with interest. The meeting is frequently closed by one of Moody and Sankey's Hymns; and when it is well sung in parts, it produces a very marked effect, even though they understand but generally what the hymn is about from a few words of previous explanation. I have great faith in the daily religious service. Some time soon it will bear fruit.

"The first tusk of ivory was brought into the settlement a fortnight ago, and bought by Mr. Cotterill for 14*l*. I shall not mention the weight of it, but simply say I would not recommend any one to come here to purchase ivory at present, with the view of making a profitable business of it. Mr. Cotterill apparently bought it simply to commence operations and to encourage the others.

"Our first visitor from the outside world also arrived at Livingstonia the other day. He comes straight from the Punjaub, where he has been working as an engineer for eight years on the Sirhind Canal, and having a furlough of two years, and having also been in Europe lately, and wishing to spend a part of his furlough in some useful way, comes here and asks if he can help us, and place himself as a volunteer on the Livingstonia force for a year; and all this from pure interest in the enterprise and in the success of missionary work. If he was not a relative of my own, and also a James Stewart, I should be disposed to say this example is worth following by Christian men who have occasional periods of leisure. Here is a vigorous young fellow who does not care for spending two years in lounging about continental picture galleries or in the pleasant work of the old country, but who believes he can be of use elsewhere, and forthwith, after one or two letters on the subject, starts off, and we have him here amongst us. The idea is a new one; and it suggests that many young men of different professions and occupations might aid the mission cause temporarily, and yet permanently benefit it by a similar course of action. His coming has already benefited us, and cleared up our misty news on various pieces of work going on or to be attempted. The first important work, however, that he will undertake will be a survey of a road over the Murchison Cataracts. We shall probably offer this survey, when completed, to one of the branches of this great International Society inaugurated by the King of the Belgians: it will form an *experimentum crucis* as to whether actual work is intended by that Society. If they do not aid in the making of the road, we shall just have to make it in an inferior style ourselves.

"We also got here last week our first importation of cattle, consisting of seven cows, three calves, and a bull. They were brought 450 miles, partly by land and partly in the steamer, and the business was well managed by Dr. Laws. I fear, however, we have *tsetse* in this district, and, if so, it is a heavy blow to us. A short time will make the matter plain—a few months at most. No worse blow to our peaceful progress and prosperity could occur than this.

"Since writing the above an accident to a portion of the machinery of the steamer has caused delay in sending this off. The mischief is now quite repaired.

"March is one of the most unhealthy months here (April further down), and both Dr. Laws and myself have had pretty severe attacks, and some of the others have also suffered. The last man to succumb, Shadrach Ngunana, from Lovedale, who has never yet had the slightest touch of fever, has suffered slightly. Average health among the others. A greater variety and better food would prevent that anœmia that seems to be the worst part of the fever.

"James Stewart."

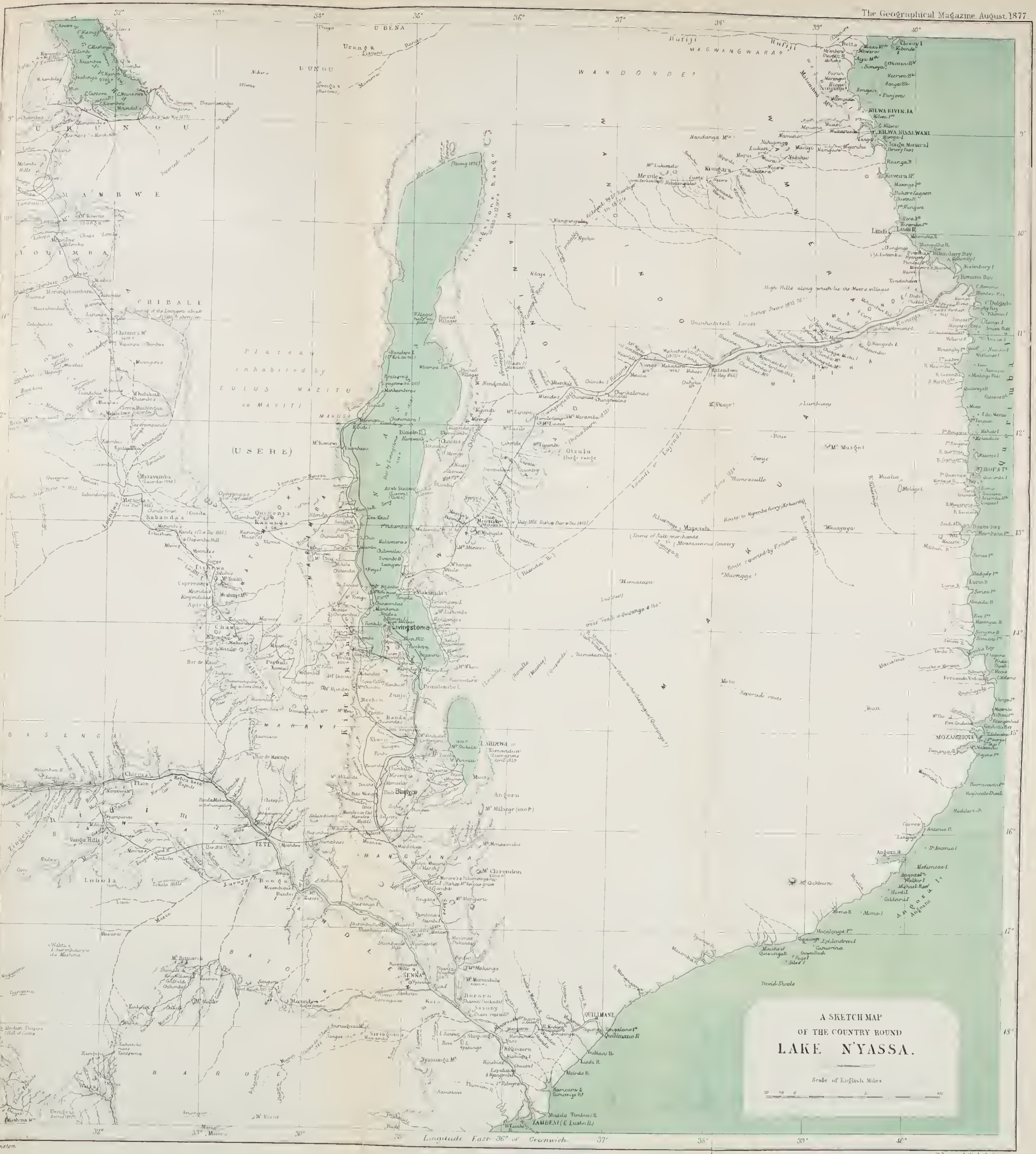
THE GREAT EARTHQUAKE ON THE COAST OF PERU.

(May 9th, 1877.)

The earthquake, with its accompanying inundating wave, which spread desolation along the coast of Peru on the 9th of May 1877, was one of the most destructive on record. These convulsions of nature deserve close attention from physical geographers, and we therefore propose, before describing the more recent catastrophe, to give a list of the recorded earthquakes on the west coast of South America. At Lima there are, on an average, about eight shocks of earthquakes in a year; and only those have been placed on record which were so violent as to cause destruction of life and property. Mr. Mallet has compiled a valuable list of all recorded earthquakes in every part of the world from the earliest times to the year 1842,[*] which was continued down to 1850 in the annual catalogues of Professor Perrey, of Dijon. But the list is incomplete, and we have supplemented it from other sources. The principal autho-

---

[*] *Earthquake Catalogue of the British Association.* By Robert Mallet, F.R.S., and J. W. Mallet. 1858. See an account of Mr. Mallet's labours in Sir R. Murchison's Anniversary Address for 1859. (*R.G.S.J.* vol. xxix. p. 157.)



A SKETCH MAP
OF THE COUNTRY ROUND
LAKE N'YASSA.

Scale of English Miles

hnston

T. Leuth & Co. Lith. L

rities on earthquakes on the west coast of South America are Acosta, Molina, Ovalle, Llano y Zapata, Unanue, Bouguer, Ulloa, Humboldt, Meyer, Darwin, and FitzRoy. The phenomena of some of them have been very carefully observed.

1570.—An earthquake is recorded by Molina, at Santiago and Valparaiso in Chile, accompanied by land slips and a great wave.

1578. *June* 17.—An earthquake at Lima.

1581.—Acosta (Lib. III. cap. 27) says that Chuqui-apu (La Daz) was ruined.

1582.—A great earthquake at Lima and Arequipa.

1586. *June* 9.—A violent earthquake at Lima, extending far down the coast. An immense wave inundated the country for two leagues inland.

1600.—An earthquake at Arequipa, with a thick rain of ashes lasting for twenty days.

1609. *Nov.* 17.—An earthquake felt at Lima and Arequipa.

1630.—An earthquake at Lima.

1647. *May* 13.—Molina records an earthquake on the Chilian coast

1651.—An earthquake all along the west coast.

1655. *Nov.* 13.—Lima was much injured by an earthquake.

1657. *March* 15.—A violent earthquake at Santiago.

1658.—An earthquake at Concepcion.

1660.—An earthquake at Arequipa.

1667.—A great earthquake at Arequipa, and a violent eruption of the volcano.

1678. *June* 17.—An earthquake at Lima, and to the northward. The sea receded and returned with great violence.

1682. *Oct.* 19.—An earthquake at Lima.

1687. *Oct.* 20.—An earthquake at Lima, with a great wave which destroyed Callao. First shock at 4 A.M. Second at 6 A.M. (See *Philosophical Transactions for* 1694, p. 70.)

1688. *Oct.* 10.—Earthquake at Lima.

1690.—Earthquake at Lima.

1697. *Sept.* 29.—Very violent earthquake at Lima.

1698. *June* 19.—Earthquake round Quito. The summit of the volcano of Carguariazo fell in, streams of sand and water flowing from it. Hambato and Llactacunga were ruined.

1699. *July* 14.—Earthquake at Lima.

1709. *March* 20.—Earthquake at Lima, preceded by explosive noises.

1710. *April* 15th to *Jan. 1st,* 1711.—There were 14 earthquakes, preceded by subterranean noises, on the Peruvian coast.

1716. *Feb.* 6.—Earthquakes injured Lima and Arequipa.

1722. *May* 24.—An earthquake at Santiago.

1725. *Jan.* 9.—Earthquakes at Lima and Arequipa.

1730.—Earthquake and great wave at Concepcion.

1732.—Earthquake at Lima.

1734.—Three severe earthquakes at Lima.

1742. *May* 9.—Earthquakes at Lima and Santiago. The first shock lasted nearly a minute, followed by many more shocks up to the 10th.

1743. *Oct.* 14.—Earthquakes at Lima and Arequipa, preceded by much noise.

1746. *Oct.* 28.—The great Lima earthquake. There had been much subterranean noise for some days previously. The first shock was at 10.30 P.M., and lasted four minutes. In the following twenty-four hours there were 220 shocks. Lima was almost entirely ruined, and 1141 people were killed. Callao was overwhelmed by a vast wave, and out of a population of 5000 souls, 4800 perished. The wave is said to have risen to 80 feet. It carried the Spanish frigate, 'San Firmin,' right over Callao, and she was stranded nearly a mile inland. Out of twenty-three vessels at anchor, nineteen were sunk. Part of the coast was submerged, and a bay was formed. The ports of Cavallos, Guanape, Chancay, and Huara were also overwhelmed. Near Lucanas, in the Andes, a mountain opened and hot water came forth. The same thing happened in Pataz. The shocks continued until February 1747, and altogether there were 450 shocks.*

1751. *May* 24.—An earthquake at Concepcion, extending to Juan Fernandez.

1755. *April* 28.—An earthquake at Quito.

1760. *April.*—An earthquake at Truxillo, in Peru.

1760. *Dec.* 28.—A severe earthquake at Lima.

1762. *Dec.* 3.—An earthquake at Chile.

1784. *May* 13.—An earthquake at Arequipa.

1795.—At Tarapaca, in Southern Peru, there were forty shocks in one day.

1796.—An earthquake at Copiapa.

1797. *Feb.* 4., 7.45 A.M.—A violent shock at Rïobamba, in the Province of Quito. The volcano of Tungaragua was the centre of disturbance, and the earth was shaken for 40 leagues from south to north. The earthquake was perceptible for 170 leagues, from Piura to Popayan, and 140 from west to east, from the Pacific to the River Napo. The first shock is said to have lasted for nearly four minutes, and the shocks continued at intervals until April 5th. Flames and vapours issued from a lake near Llactacunga, there were loud subterraneous reports, and great clefts were opened round the volcano of Tungaragua. The town of Rïobamba was destroyed, and 30,000 souls perished. The vertical action of earthquakes showed itself here in a remarkable way. Corpses of people who perished were hurled to a height of several hundred feet on the hill of La Cullca. (*Humboldt. Cosmos* I. p. 191.)

1806.—Severe shocks at Lima.

1818.—A series of heavy shocks at Tarapaca during fifteen days. Also at Copiapo.

1819. *April* 3, and on the 4th and 11th.—Copiapo destroyed.

1820.—Coquimbo nearly destroyed, but the shocks were quite local.

1822. *Nov.* 4.—Severe shocks at Copiapo and Coquimbo.

1822. *Nov.* 19, 10.15 P.M.—Severe shocks, extending down the Chilian coast to Concepcion, and inland to Mendoza. The centre of disturbance was a few miles from Valparaiso; for, north of that port, the shocks came from S.W., and south of it, from N.W. Violent shocks lasted for half a minute during the whole night. The first three were most severe. The shocks continued at intervals until September 1823. At Valparaiso there was a great wave. Melipilla, Quillota, and Casablanca were destroyed.

1823. *Jan.* 15.—Severe tremblings at Santiago.

1824. *Aug.* 29.—Earthquake at Santiago.

1825. *June* 12.—Earthquake at Santiago.

1826. *April* 22.—Earthquake of Santiago.

1827. *May* 30.—Violent shocks at Lima. The first at 7.32 A.M. Also at Santiago.

1828. *March* 30, 7.32 A.M.—Severe shock at Lima and Callao, felt also at Arequipa to the south, and Truxillo to the north. It seemed to be passing out from the Andes to the sea. The shocks at Lima lasted twenty-nine seconds. They were felt on board the 'Volant.'

1828. From *April* to *August.*—Numerous severe shocks at Santiago.

1829. *Oct.* 26.—Violent shocks, but of short duration, at Santiago and Valparaiso. Many houses were destroyed, and Casablanca was entirely ruined.

1831. *Oct.* 8.—Earthquake at Arica, extending to the southern frontier of Peru, and north as far as Camana, over 420 miles. The first shock was at 9.30 A.M., coming from south to north, followed by others at 11 P.M., and 5 A.M. There were ninety-seven minor shocks up to Feb. 7, 1832. This earthquake was felt 100 miles out at sea.

1832. *Dec.* 31.—An earthquake at Huasco in Chile.

1833. *Sept.* 18.—An earthquake at Arica.

1835. *Feb.* 14.—Slight vibrations at Santiago.

1835. *Feb.* 20.—First shock at 11.30 A.M.: felt all over Chile, and at Juan Fernandez. There were three oscillations from Chiloe to Copiapo, the second and third being the most violent, from S.W. to N.E. Between Feb. 20th and March 4th there were 300 shocks. The sea retired twice, and came back in enormous waves, and there were two eruptions from the sea. Great fissures were formed, and the coast was elevated several feet. This earthquake was observed and reported upon by Darwin.

1835. *Nov.* 11.—A severe earthquake at Concepcion. The volcanos of Osorno and Corcovada were in violent action.

1837. *Nov.* 7.—A violent earthquake and great movement of the sea, on the Chilian coast. Valdivia ruined.

1847. *Jan.* 19.—Earthquake at Copiapo.

1861. *March* 20, 8.45 P.M.—A great earthquake at Mendoza, on the east side of the Andes. The first shock destroyed the town, killing 16,000 people. In the following ten days there were eighty-five shocks coming from S.E.; but they were not felt in Chile. Showers of ashes on the Uspallata Pass.

1868. *Aug.* 13.—A fearful earthquake, which nearly destroyed Arequipa, and levelled the cathedral. Tacna also suffered. A great wave rushed upon Arica and landed the American steamer 'Wateree' high and dry. Iquique was also ruined. Altogether 25,000 lives were lost. Shocks continued until Aug. 15. A sum of 11,000*l.* was collected in London for the sufferers.

---

* *A True and Particular Account of the Dreadful Earthquake at Lima on the 28th of October* 1746, published at Lima by command of the Viceroy, and translated from the original Spanish. (London. 1748. Pp. 341.)

There is another fuller account by Llano y Zapata, reprinted in the *Revista de Lima* for April-May 1860, and edited by Don Manuel Z. de Peralta.

1873. *July* 7.—Earthquake at Valparaiso, the oscillations from N. to S., confined to the seaboard and 30 miles inland. 2.20 A.M., a violent and prolonged shock, which brought down many houses. (See *Geographical Magazine*, Oct. 1873, p. 300.)

1875. *Dec.* 4.—A severe earthquake, with thirty-seven shocks, reported at Abancay, in the interior of Peru. (See *Geographical Magazine*, March 1876, p. 78.)

The dreadful earthquake of May 9th, 1877, appears to have had its origin in the volcanic mountains near the frontier of Peru and Bolivia. Consequently it was most severely felt in the extreme south of Peru, at those promontories covered with guano deposits which we have described in former numbers. (Dec. 1874, p. 370, and May 1877, p. 125.) There were settlements formed upon them, and many ships at anchor waiting for cargoes of guano. At Pabellon de Pica, one of the largest guano deposits, there was a settlement called Chanavaya, consisting of 400 houses. At 8.25 P.M. of May 9th there was a severe shock, and every house (except two) was levelled to the ground. Huge boulders began to fall from the hills, and thirty labourers were buried in a guano cutting. Then a great wave, 35 feet high, swept over the ruins, and four more waves came in between 8.25 and 10.10 P.M. Meanwhile, the havoc was terrible among the shipping, and all the launches were destroyed. Seven ships were lost, others were much damaged by collisions, and the loss of life is placed at 200.

At Huanillos, another guano deposit, the cuttings fell in, and all the houses were destroyed. The ships 'Avonmore,' 'Geneva,' 'Conway Castle,' and 'Conference,' were sunk. The unfortunate master of the 'Avonmore,' Captain Corfield, lost his wife and children, though he himself was saved. At a third guano deposit, called Punta de Lobos, two vessels were lost and fourteen seriously damaged.

At the same moment all the southern ports were overwhelmed. Tocapilla was destroyed. At Cobija, in Bolivia, most of the houses were ruined, and a wave 35 feet high destroyed all the boats. The nitrate works between Cobija and Tocapilla were washed away; while the mine of La Peña Blanca, four miles south of Tocapilla, fell in, and 200 workmen were smothered. At Antofagasta the sea completely swept the town, and Mexillones also suffered.

The first shock at Iquique occurred almost at the same instant (8.22 P.M.). Shock followed shock, destroying the houses, and a fire broke out. Then a great wave poured over the ruins. The custom-house and all the nitrate stores are gone. The water condensers are ruined. All the warehouses have disappeared, and every boat is destroyed. Two vessels sunk. The damage is estimated at $1,605,000. At first there was a rumbling noise and a slow movement of the earth, followed by tremendous oscillations from S.E. to N.W. One shock lasted four minutes and twenty seconds without cessation, and there were two great tidal waves.

At Arica there were numerous shocks, the sea suddenly receded, and then a wave 75 feet high rolled in upon the shore. This was repeated eight times. The custom-house and many private houses were levelled to the ground. The wave extended farther inland than in August 1868. Four miles of railway embankment were destroyed, locomotives and rails were rolled about, and left in a confused heap of rubbish. The American steamer 'Wateree,' which had been stranded in 1868, was lifted up bodily and floated two miles north of her former position. All launches and boats were destroyed.

At Mollendo the railway was torn up by the wave for about 300 feet. But Arequipa escaped altogether, and there was only slight damage at Pisco. On May 14th there were severe shocks at Lima and Callao, felt also at Ancon, at 7.10 P.M. and 9 P.M. But, though there was much alarm, very little damage was done.

Thus, the earthquake coming from the south, spent its chief fury near its centre of origin, and gradually worked itself out as it went north. It also appears to have trended more to seaward than is usually the case with these meridional lines of disturbance. On the 9th, the Pacific Steam Navigation Company's vessel 'John Elder,' when 23 miles west of Antofagasta (lat. 23° 43′ S., long. 70° 47′ W.), and going full speed, was suddenly stopped as if she had struck a rock at 8.30 P.M., and remained stationary for five minutes. The sea was perfectly smooth, and there was no bottom at 20 fathoms. The steamer 'Eten,' anchored off Antofagasta, experienced a severe shock, and was shaken during two minutes from 8.30 P.M. At the same hour the steamer 'Coquimbo' felt a violent shock for fifty-five seconds, off Pisagua. The Tahitian brigantine 'Tawera' felt a severe shock on the 8th of May, at 4 P.M., in lat. 35° 30′ S., and long. 104° 52′ W.

The centre of commotion appears to have been the volcano of Llaga, near the frontier of Peru and Bolivia, which was in a state of activity, as well as San Pedro de Atacama. A red glare was seen in that direction from Antofagasta, and at Pabellon de Pica a peculiar light was seen in the western sky, during the earthquake. The Chilian coast escaped without injury, and the force of the earthquake was spent before reaching Callao.

The loss of life is placed at 600 souls, and the destruction of property at $20,000,000.

Creditably prompt steps were taken for the relief of the sufferers. The first who came to the rescue was Captain Clayton, of the Pacific Steam Navigation Company's steamer 'Atacama.' He took on board and supplied with necessaries 350 unfortunate people at Pabellon de Pica and Huanillos, 120 at Tocapilla, 80 at Cobija, and 320 at Mexillones. Supplies were sent both from Lima and Chile. The Peruvian Minister, Dr. Rosas, chartered the steamer 'Copiapo,' and put on board about 2000 packages of provisions by the 15th of May; and the Chilian steamer 'Abtao' went off with $752,536 worth of goods for the sufferers.

It would have been more to the credit both of England and Peru, if the 'Shah' and 'Huascar,' instead of hammering away at each other all the afternoon of the 29th of May, had also been engaged in conveying succour and relief to the hundreds of houseless and destitute families along the coast. As regards the guano settlements, where so many British vessels are constantly loading, the duty of relief belongs quite as much to England as to Peru.

The phenomena of earthquakes on the Pacific coast are very important, and should be observed more accurately and systematically than has hitherto been the case. We believe that the best account of an earthquake wave was published by Professor Bache, at Newhaven, in 1856. The suggestions of Professor Perrey, in 1853, as to the connection between earthquakes and the moon's age, and as to the influence of currents of earth magnetism in producing earthquakes, should lead to the careful collection of more reliable data. Mr. Mallet came to the conclusion that no generalisation can be elicited from mere cataloguing of earthquakes. But he recommended observations at self-registering seismometrical establishments at suitable localities in earthquake regions; and he has pointed out the best methods of observing in his valuable paper in the Admiralty *Manual of Scientific Enquiry.* Hitherto, really accurate observations have only been obtained when such a man as Darwin has happened to be on the spot. It seems desirable, in the interests of physical geography, that a system should be established for the accurate observation of earthquake phenomena at the principal ports on the west coast of South America.

EXPLORATION IN PATAGONIA.

The following interesting report has been received by the Minister of Foreign Affairs at Buenos Ayres, from the well-known Argentine Naturalist and Explorer, Don F. P. Moreno:—

"Punta Arenas, *14th April, 1877.*

"In my first communication I gave your Excellency a general account of the results of my voyage from Buenos Ayres to the River Santa Cruz, and announced my speedy departure for the interior of the country. The preparations for this began at once; but since there were no Indians then in the neighbourhood who could supply me with the necessary horses, I was delayed for some time, and employed myself in short excursions. In one of these I went over a considerable portion of the territory comprised between the river and the Atlantic, as far as the Isla de Leones, part of which I had examined in 1874. Afterwards I went to San Julian, at which place I was told Indians might be met with; but on arriving there I found that they had moved westward; and since sufficient means of transport were not to be obtained, I was obliged to change my plans, and to follow their trail as far as the 'tolderias.' These were situated on the banks of a small river, which empties itself into the Rio Chico, not far from its embouchure in the Bahia de Santa Cruz. This is certainly the Rio Chalia which Viedma mentions in his diary, and which he believed to fall into the Santa Cruz. Captain Musters did not see it, but was of opinion that Viedma had crossed the Rio Chico twice, taking it for two distinct streams. This river, the course of which we followed for a distance of about 90 miles, flows in a wide and level valley, so little accidented that a railway might be made along it from the Atlantic to the foot of the Andes, at little cost. In parts it has very fertile levels, which might be used advantageously for pasturing small herds of cattle. The district in which the Indians live is named Shegueri, and from it the great Cordillera can be distinctly seen, with its perpetually snow-clad peaks. The friendly Tehuelches gave us three horses, in exchange for some provisions, and I was allowed to make a number of measurements of the stature of these people, who are, without doubt, the tallest of all the races on the globe. Having succeeded in the object of my visit, I returned to the mouth of the Santa Cruz, and set out again thence, on the 15th of January, in the direction of the source of the river. The expedition consisted of Sub-Lieutenant D. Carlos M. Moyano, three of the boat's crew, a man and a boy to take care of the horses, and myself.

"At the time of our outset the river was rising rapidly, and had already exceeded considerably the limit of highest flooding formerly known, so that the work of towing the boat had to be done on foot; on horseback it proved extremely difficult and dangerous in some places. The boat was exceedingly heavy and undermanned, the number having been arranged for a light skiff of half the size. All the expeditions before ours in which attempts were made to discover the sources of the Santa Cruz, were much better fitted out. In 1834 the expedition of Admiral Fitzroy comprised a number of officers and three boats, manned by eighteen sailors; but it returned after twenty-one days of hard work without having accomplished its object. The Chilian Commission, which recently attempted to ascend the Santa Cruz with a steam launch and two rowing boats towed by horses, returned to its mouth after ten days' travelling, having only traversed a small part of the river. The expedition which was sent in 1873 by the commander of the Argentine goleta 'Chubut,' in charge of Sub-Lieutenant D. Valentin Fulberg with a whale boat and four men of a crew, was the only one that reached the point at which the lake pours its waters into the Santa Cruz. There I found a document beside the remains of a flag, left by that gallant officer, who was prevented from exploring the lake by bad weather.

"The expedition which I have had the honour to direct has been more fortunate. With a boat measuring 28 feet, with only three men to work her, and after a month of almost continuous labour, in which we had to struggle against the velocity of a current which sometimes even exceeded 10 miles an hour, with many rapids, with an abnormally great flood, and with perpendicular barrancas, 200 feet in elevation in some parts, we reached the lake in which the Santa Cruz takes its rise, on the 14th of February. It lies in 50° 14′ 20″ S. lat., and approximately in 71° 59′ W. of Greenwich. Two days later we crossed it in the only boat that had ever floated on its waters. We spent several days in visiting the different portions of it, in making collections, and in taking a sketch survey of the lake. On one part of its shores we discovered an ancient habitation of some of the primitive people of Patagonia, and a partly mummified body was found beneath a scarped barranca. Unfortunately the windy season had already set in, and the heavy storms prevented us from taking the boat to the extreme west of this fine lake, which measures 30 miles in length from east to west by 10 miles at its greatest width, and which is profoundly deep, no bottom having been obtained with a line of 120 feet at two miles from the shore.

"The boat, which was a bad sailer, was not fitted for navigating the lake at this season, in which the winds raise a surf more terrible than that of the port of Buenos Ayres during a south-east wind. Having lost a considerable part of the provisions and of the collections from this cause, I determined to continue the exploration on horseback. Two of the crew and the boy were left in charge of the boat, with the provisions which remained, and, with Señor Moyano, I set out towards the north, crossing a series of tablelands of tertiary formation, 2500 to 3000 feet in height, the summits of which were covered with large caps of basalt. In a little valley we met with the same Indians of Shegueri, who had come hither in search of 'baguales' (strayed animals): they hired to me three fresh horses, and one Indian offered to serve us as 'vaqueano' to the districts we were about to examine. We kept on in the same direction until we came upon the Chalia again, where it was flowing S.W., and, crossing it, we passed on N.W. until we reached a chain of little lagoons, surrounded by excellent pasture: the largest of them is 5 or 6 miles in length, and is called 'Far,' or 'dirty,' by the Indians, on account of the colour of its water. More to the west we discovered a hitherto unknown lake. Though of smaller dimensions and of different character from that in which the Santa Cruz rises, it is not less important. It lies surrounded by mountains of 3000 to 5000 feet in relative elevation, most of them volcanic, with their summits covered with snow, and with abundant wood on their sides: it appears to form part of a lake of still larger extent, to judge by the report of the Indians, who from the summit of a hill have seen a 'much larger water' in the west. Although little reliance can be placed on the statements of the Indians, I believe that the larger lake exists, since we saw a wide channel in that direction separating two folds of the sierras, behind which we could perceive a great bay or hollowing in the base of the range of the Cordilleras. Through this channel large masses of ice float into the lake which we saw, and some of these, broken into huge fragments, had been driven ashore close to the place where we camped. The latitude observed there was 49° 12′ S. Since it has remained quite unknown to any of the travellers who have hitherto visited Patagonia, and since it has no Indian name to distinguish it, I have called it the Lago *San Martin*, as a humble tribute to the memory of the illustrious Argentine General.

"Finding ourselves quite without supplies, and reduced to quarter rations, and with tired-out horses, I returned to the 'Far' lagoon. Thence we continued south by a narrow valley, but one which abounds in good cattle-pasturing spots, irrigated from point to point by permanent streams—among these that of the Chalia which rises somewhat farther to the west among the mountains, where it gathers from little torrents. After crossing the summit of a basaltic plateau of considerable elevation, we reached the lake discovered by Don Antonio de Viedma in 1782, and whose name it bears. The name 'Capar,' under which it appears on the maps, is not Indian. Perhaps it is a corruption of 'K'char,' an Indian halting place or camping ground on its shore. Viedma's lake is the largest that I have seen in Patagonia. It extends as far as the foot of the Cordillera, where it is fed from the snow-drifts, and has its greatest length in a W.N.W. direction, the head of it being closed by the magnificent volcano of Chalten, which is in activity. At a moment when the clouds cleared off, and allowed the bold cone to be seen, a light column of smoke was also visible ascending from the crater. Afterwards from other points of view, I frequently noticed a large smoke cloud in this direction, and the Indians said it was from the Chalten. They say that it throws out ashes and smoke only.

"We traversed the eastern and part of the southern shores of Lake Viedma, until we found the way barred by a river of 200 yards in width by which the two lakes communicate. The point at which this flows out of Viedma's lake is in lat. observed 49° 48′ S., and that at which it enters the lake which supplies the Santa Cruz, is in 50° 11′ S. This is the river that Viedma took to be the Santa Cruz, being unaware of the existence of the other lake to the south of it. I have called it the 'Rio Leona,' in remembrance of an attack which we experienced from a puma in its vicinity. From this point we returned to the place where we had left the boat.

"A few days later we crossed the Rio Santa Cruz, and, leaving the boat and the crew behind, I went westward, accompanied by Señor Moyano and one man, to examine the extremity of the lake. We rode as far as the woods permitted, and then continued on foot, leaving the man in charge of the horses. The way was extremely difficult on account of the vegetation and the roughness of the ground, and we were delayed at every step. Little torrents were very numerous—we crossed at least eighteen of them. We skirted a height at the foot of which flowed a broad channel which communicated with a smaller lake situated farther south, but these two may be considered as almost one. Where the mountain became so completely precipitous that it was impossible to advance farther, I left a document attesting our nationality, and the Argentine flag at the side of a large boulder rent by the frost from the neighbouring snowy heights. The 'Argentine Lake' (a name which I have given to it since those who first reached it and discovered that it was quite distinct from Viedma's lake), had several huge ice islands floating in it at the time of our visit. One of these, of great dimensions, and rising apparently about 70 feet above the water, floated about for nearly a month; but during the last days of our stay the heat was very great, and we were sorry to see this huge berg, which we had admired for so long a time, broken up and scattered in fragments about the lake. The melting of the snows in the Cordilleras was then so great, that the Rio Santa Cruz had risen 63 feet on the 17th of March. Since provisions for a very short time only remained, and as it was impossible to use the boat now against the current, we turned to go down stream. In twenty-four hours we descended the distance that had taken us a month to ascend. Owing to the great flooding, the current was much more rapid even than when we came up. In some parts the river was now a mile wide, and the least depth noted in the channel was 30 feet. In other parts the sounding line showed as much as 70 feet, up to 84 feet. At some moments it was impossible to control the boat, in consequence of the great eddies caused by the current, and some passes were quite dangerous. In other reaches the boat flew along at 15 miles an hour. An extended report upon the examination of the regions we have visited must be left till my return. I have made some collections, and have examined the extensive tertiary formation which extends as far as the Cordillera, and I have gathered some interesting fossils. The immense quantities of erratic blocks, some of them 500 cubic yards in bulk, are also interesting. Some of them have been dropped about the Bahia de Santa Cruz, where they reach a cubic yard in size; others are scattered up to an altitude of 2000 feet in the table lands close to the Cordillera. The Rio Santa Cruz may be considered navigable for steamers drawing 12 feet of water, but these would require to be of great power. By means of the rivers, if the exigencies of the inhabitants of these regions should ever require it, the country could be crossed as far as the Andes.

"In Santa Cruz I left the boat and the men in charge of the collections, till they can be sent to Buenos Ayres, and I reached this place on the 12th inst. (April). Having fulfilled the pleasant duty of announcing to your Excellency that the 'Plains of Mystery' of Admiral FitzRoy have ceased to correspond to their name, it only remains for me to commend to you my companion, D. Carlos M. Moyano, who shared with me all the good and bad fortune of the expedition. "F. P. Moreno."

THE INDIA-RUBBER TREES IN BRAZIL.

(Continued from page 187 of our last number.)

Observations relating to the Rubber-producing Tree of Central America.—I will now add a few remarks concerning this tree, which I collected in the interior of the Isthmus of Panama towards the latter end of 1875—this, because I think it has not received the attention it deserves. There are now a good collection of plants at Kew, and I am surprised that more have not been sent to India.

The tree inhabits wooded regions near Guayaquil and Buenaventura, and has likewise been met with abundantly in the State of Panama, and in the Republics of Costa Rica, Nicaragua, Honduras, Guatemala, and Mexico. It is one of the largest and most massive of the trees of Western tropical America. The trunk often attains to a surprising thickness and height, yielding in some instances above a hundred pounds of india-rubber. The wood is extremely soft, and, when cut into, decays rapidly. The destructive method of cutting down the tree to be tapped has exhausted extensive rubber localities, and, although others may be opened up, yet the supply is certain to diminish at no distant date. Even where the trees are not felled, as in Nicaragua, the method of tapping—by which the wood is injured—is so unskilful that it has been considered by some as preferable to cut the tree down at once. The climate of various of those rubber districts is hostile and severe, and some places, such as the forest regions of Buenaventura and Chocó have no parallel in the universe. Throughout the State of Panama drenching rains are almost of daily occurrence, and occasionally, on the Atlantic side, hurricane blasts make avenues in the forest. The district investigated by me, and where the plants were collected, was reached by ascending for some distance the river Chagres, and then travelling for several miles through a stately forest into the heart of the isthmus. The trees seen exceeded in height and dimensions those met with in the wooded districts of the Amazon. An undergrowth of a thorny, wild pine apple (*Bromelia*), 10 feet in height, everywhere formed extensive thickets. Large powerful snakes were numerous and so audacious that they deliberately rose up to strike at any one that approached. The young rubber saplings were found growing most abundantly on the banks of cool, clear running streams and little dribbling rivulets. The roots could easily be traced over the surface of the ground, running down to the very margin of the water. But the tree grew also on eminences, steep declivities, and varied elevations, and in such abundance that the first explorers gave the name "Caoutchouc Hill" to a height which they found crowned with a forest almost entirely composed of rubber trees. It was not seen growing anywhere on swamp or marsh land. Although the rubber districts are proverbially rainy, yet the tree was seen by me growing beside a stream on the border of a desert tract of country bounding the Gulf of Guayaquil, where only a few light showers of rain fell during the year. On both sides of the stream there was a strip of good forest, but, beyond, thickets of cactæ and low, spreading legumes formed the characteristic vegetation. I mention this fact to show that the tree will probably succeed well in regularly-irrigated districts, even if the atmosphere be dry and dusty. The temperature in the woods of the isthmus ranged from 75° to 88° Fahrenheit. Rain water, examined the moment it fell, was never found to be below 74°. The usual practice in collecting the milk was by felling the tree and then making deep notches around the trunk, at distances not exceeding 1 foot apart. Broad leaves were placed beneath these to receive the milk, which afterwards was collected in a large calabash or other vessel. A hole was then dug in the ground, and the milk poured into it and thatched over with leaves. It coagulated in about two weeks. Another method was to bruise a handful of the large, broad, heart-shaped leaves of a climber—a species of *Ipomea*—and stir these about in the milk. By this operation the milk thickened, in less than an hour having the appearance of a jelly-like mass, but very porous, and exuding profusely a black ink-like water whenever touched or moved. This system of preparation produces an inferior article, and I have seen some buyers from the United States cut up the large juicy flakes into slices an inch or so in thickness and dry them in the sun. The temperature of the sea water along the west coast, where the rubber tree grows, is high, and does not vary much during the year. In the Gulf of Guayaquil it is usually 78°, at Buenaventura 80°, and in the Bay of Panama 79°. The water of the River Chagres, although 80° in fine weather, falls during violent rains to 76°. On such occasions many fish are to be seen in certain places floating about in the water, benumbed like, or dying. I do not know if this is the result of the sudden lowering of the temperature, or if it is to be attributed to the great quantity of decayed vegetable matter brought down by the discoloured swollen torrents from the interior of the forests.

In India there are many districts which possess all the climatic conditions necessary for the successful cultivation of central American rubber. From Bombay, southward, the majority of the deep debouches of the Ghauts coming from the base of the western slope of the Malabar hills, including the humid forest region, extending in places down towards the coast, contain many excellent sites. In Ceylon and southern Burmah and the Malay peninsula, the tree is likely to thrive in all proper situations. Calicut is about in the same latitude as the centre of the region occupied by this rubber tree in its wild state. The deep recesses of the Sispara Ghaut, really, closely resemble some of the caoutchouc districts adjoining the River Dagua. The sites selected ought to be at low elevations, and no place should be tried where the temperature at any time during the year falls below 60° Fahrenheit. Marsh land must be avoided. In dry desert localities the tree may be expected to do well when planted along the banks of canals or any description of channels where water is flowing for the whole or a portion of the day. Trees in good situations will produce seeds early, but these will require to be planted without delay, as drying destroys their vitality. But cuttings must be resorted to first, and stout branches cut into pieces, each possessing a bud and covered lightly with soil, will generally be found to grow. Strong cuttings a foot in length and furnished with buds, when planted in the usual way, will become strong plants sooner. However, the propagation of this tree will not be found so easy as the Ceará rubber.

In the planting out of young plants, the petiole, or leaf-stalk, of the lowest or oldest leaf, should be buried in the soil. By following this simple rule, the plant commences to grow at once, its growth is vigorous, and the trunk symmetrical. But if at the period of planting there is much bare stem above ground, then growth is usually slow, the plant remains "leggy" for some time afterwards, and never makes a good tree. If the plants get a little attention until they are four or five feet in height, I do not think there is any description of weeds or forest growth in India that will afterwards overtop them. The rapid growth of this tree, by which a large amount of vegetable mould is added to the soil, is an important feature. My own opinion is, that if planted in suitable places, and properly wrought, it will be found to yield a larger return per acre than any other plant or tree cultivated in India.

Concluding Remarks.—In commencing the cultivation of these trees in India, it may be well to ascertain by actual experiment, as early as possible, the species likely to yield the largest amount of caoutchouc. It is possible that as regards quality there may be little, if any, difference in the milk of the various kinds, when collected and prepared in the same way. As has been already stated, each of the three sorts require rather different sites, a wet or swampy situation being most natural to the Pará tree, while the moist banks of rippling streams or rivulets wll be found well suited for the species from Panama. The Ceará tree is not delicate, and will grow and produce rubber in situatious where other kinds, if planted, would be dried up. For these reasons it is likely to prove a valuable plant in India, in parched up regions and stony, unproductive lands, thinly covered with soil. The cup method, if employed in an extended way, may be found a convenient mode of tapping. Thus, twenty rows of cups, distributed over the entire trunk, might be put on at one time. The earth could also be cleared away from underneath the large roots, to allow of their being properly tapped. Even by the rude method adopted in South America—by which the wood is much hacked—the roots are found to yield milk abundantly, at all seasons, of excellent quality. But whatever method is adopted, it is evident that if care is exercised, tapping may be carried on continually. The Pará tree in many localities gets no rest, except during a very "wet moon," or when the collectors are drinking *cachass*. Therefore the idea of giving the trees one or two years' rest ought not to be entertained. The Ceará method of paring off the surface of the bark might be tried on any of the sorts in dry weather.

Pará and Panama trees may be tapped on attaining a diameter of, say, 6 or 8 inches, and that of Ceará with a diameter of 4 to 5 inches. A collector in a plantation, working with cups, should be able to collect easily from eight to ten pounds of rubber per day. On the Amazon, in newly opened districts, where the trees have not been operated on before, practised hands are sometimes able to collect from 20 to 30 pounds daily. A much greater quantity may be collected in even a shorter time on the Isthmus of Panama and adjacent regions; but then the trees are cut down to obtain the milk—a plan which, it is assumed, will not be followed in India. The cup process of tapping, the most general in use in the Amazon Valley, is an Indian method, and is said to have been in use amongst them at the time America was discovered.

No time should be lost in reducing the milk, when collected, to a solid state; for if this matter is delayed, decomposition takes place, which furnishes much of the impurity complained of by manufacturers. If possible, the milk should be coagulated on the day it is collected. The milk of some species, such as that of the Panama rubber-tree, may keep for a week or more in a cool, shady place; but Pará rubber milk spoils within the space of twenty hours, and gives off a most disagreeable odour. All the Pará rubber is prepared by the smoking method I have described. Where nuts cannot be easily found, green foliage is used instead. The "fumes of sulphur," "ammonia," or "acetic acid" are never employed. Alum is generally used in thickening the "mangaba" milk in the south of Brazil, but it appears to destroy the elasticity of the rubber. The watery portion may be evaporated by placing the milk, in small quantities at a time, in shallow vessels attached to any simple form of hot water apparatus. Either this, or the adoption of a smoking method similar to that of Pará, will probably be found the best. The material should be prepared in thin flakes, about 1½ inch in thickness. These pieces, if made square in the form of a bale, could be fastened together, and covered with coarse cloth. In this way rubber would be both easily handled and stowed.

The milk of *Masseranduba* (*Lucuma procera*), and of one or two milk-yielding trees of the Amazon districts, reported to be mixed frequently with Pará rubber, possesses no elasticity when prepared separately.

The island of Borneo has been suggested to me as a place specially suited for the formation of india-rubber plantations. No doubt they would grow there as well as in India, but probably not any better. Although the position in point of latitude may appear in favour of Borneo as regards the Pará tree, I doubt if the climatic conditions of that island excel in any particular the southern portion of the Madras Presidency at low elevations. It must be remembered that what is termed by some the "equator of heat" is considerably to the north of our geographical equator. On the American continent it may, I think, be placed at not less than 10° of North latitude. In the dense forest regions of the Amazon and Panama isthmus the most striking feature is the extraordinary development of certain trees occupying large spaces of ground, chiefly *Ficus* and *Bomba*, mantled by a dense profusion of leafy climbers, the trunks and branches clothed with parasitical plants. In India, as, for instance, in the best forest portions of the Sispara Ghaut, there are no conspicuous large trees with buttressed roots, but there is a far more even development of general forest trees; and I have no doubt if an acre of such land was cleared, and the wood thereof weighed, it would be found to equal, if not exceed, the product of a similar extent of ground in the wooded districts of tropical America. Apart, however, there remains a more positive proof of the capabilities possessed by the climate of Southern India. The cocoanut and mango trees can only be cultivated in the hottest regions of the tropics. Now, I have visited places where these trees were planted by the natives, such as Jamaica, Hayti (St. Domingo), Porto Rico, Santa Martha, Carthagena, Panama, Buenaventura, Tumaco, Bahia, Esmeraldas, Guayaquil, and Pará, but nowhere was the fruit superior, nor hardly so large, as the mangos or cocoanuts of the Malabar coast. For these and other reasons I have confidence that there exist the necessary conditions for the successful cultivation of the American rubber-yielding trees in many parts of India.

Robert Cross.

Iter Persicum; ou, Description du Voyage en Perse entrepris en 1602 par Etienne Kakasch de Zalonkemeny, envoyé comme Ambassadeur par l'Empereur Rodolphe II. Traduction publiée et annotée par *Ch. Schefer*, Premier Secretaire interprête du Gouvernement. (Paris, 1877.)

This is a valuable addition to our knowledge of the history of the reign of Abbas the Great, the most illustrious sovereign of the Sufawi Dynasty of Persia. The motive of sending Zalonkemeny on this mission to the Persian Shah was connected with the preponderating influence obtained by France in the counsels of the Porte. Francis I. sought the alliance of the Ottoman Sultan after the Treaty of Madrid. The alliance was maintained by his successors, and the Austrians consequently strove to strengthen their power by alliances with the enemies of the Turk. Shah Abbas sent Sir Anthony Shirley on an embassy to the European powers, and he was honourably received by the Emperor Rudolph II., at Prague, in 1600. The Emperor then determined to send an envoy to the Shah, and Zalonkemeny was selected for the post. He took as his secretary a German named George Tectander von der Jabel, who, on his return, wrote the *Iter Persicum*. The work was excessively scarce, so that M. Schefer has earned the thanks of all students of Persian history by bringing out the present excellent edition. The narrative contains an interesting account of Shah Abbas and his court, of his campaign against the Turks, and of his conquest of Tabriz; besides a curious picture of Russia and its court at the commencement of the seventeenth century. M. Schefer has added many valuable notes, and a bibliography of the reign of Abbas, including much information respecting the embassies of the Shirleys.

———:o:———

On the Birds of the North Polar Basin. By *Capt. H. W. Feilden, C.M.Z.S.* (*Proceedings of the Zoological Society*, Jan 16, 1877.)

In this interesting paper, the Naturalist of H.M.S. 'Alert' draws attention to the distribution of bird life along the shores of the Polar Basin, between latitudes 82° and 83° N., the most northern land ever yet visited by human beings. On the day of reaching the latitude of the 'Alert's' winter-quarters, in 82° 27′ N., Captain Feilden saw seven or eight long-tailed ducks (*Harelda glacialis*) on a small piece of ice, a fine glaucous gull (*Lœrus glaucus*), and a single dovekey (*Uria grylle*) flying south. On September 5th, 1875, Captain Markham came across eleven eider ducks at Dumb-bell Harbour, in 82° 30′ N., and saw a single turnstone. On Sept. 19th a pair of long-tailed ducks alighted in a pool near the ship, and on the 29th a ptarmigan was seen in winter plumage. Captain Feilden saw a snowy owl seated on the top of a hummock about a mile from the ship on October 2nd. After this date no bird was seen for five months. On March 11th, 1876, three ptarmigan were seen, and on the 29th Lieut. Parr saw a snowy owl. On the 13th of May Captain Feilden heard the note of the first snow bunting (*Plectrophanes nivalis*), as he was lying in his tent at the base of a cliff. The note came from above, clear and musical. Every inmate of the tent started into a sitting posture, and said—"Hush! hush! do you hear it?" One of the sailors said to Captain Feilden—"What bird is that, sir? It is sweeter than a throstle" On May 27th Lieut. Parr met a straggling snow bunting near 83° N.; so this species can claim for itself the highest northern range yet recorded of any bird. On June 5th, whilst travelling in 82° 33′ N., Captain Feilden observed the first knots, sanderlings, and turnstones, and a flock of brent geese passed over his head. On June 6th he noticed the first long-tailed skuas (*Stercorarius longicaudatus*), and on June 24th the first king duck (*Somateria spectabilis*). Altogether, sixteen species were met with on the shores of the Palæocrystic Sea, namely:—

1. *Nyctea scandiaca* (snowy owl). Found breeding. Feed on lemmings.
2. *Plectrophanes nivalis* (snow bunting). Breeding.
3. *Lagopus rupestris* (ptarmigan). Ten brace killed.
4. *Strepsilas interpres* (turnstone).
5. *Calidois arenaria* (sanderling).
6. *Phalaropus fulicarius* (phalarope).
7. *Tringa canutus* (knot). Breeding.
8. *Sterna macrura* (Arctic tern).
9. *Lœrus glaucus* (glaucous gull).
10. *Stercorarius longicaudatus* (skua).
11. *Procellaria glacialis* (fulmar).
12. *Uria grylle* (dovekey.)
13. *Colymbus*. Species unknown.
14. *Harelda glacialis* (long-tailed duck).
15. *Somateria spectabilis* (king duck).
16. *Bernicla breuta* (brent goose).

———:o:———

Colonel Gordon's Expedition to the Upper Nile Regions. By *F. A. Edwards* (*Gentleman's Magazine* for August). (Macmillan and Co., 1877.)

At the time of our going to press, we have been favoured with an advance proof of an interesting paper, by Mr. F. A. Edwards, "On Col. Gordon's Expedition to the Upper Nile Regions." The paper is accompanied by a sketch Map, and gives a concise account of the exploring work so ably performed under the direction of Colonel Gordon since 1874.

Cartography.

RECENT PUBLICATIONS OF THE INDIAN SURVEY.

Putting aside for the moment the evidence they give of activity and power of rapid production in the department under the direction of Colonel Thuillier, and looking at them simply from a cartographical point of view, the most noticeable feature in the last large parcel of maps received from India is that of the great variety of quality which they display. We have here a few maps which are models of excellent cartography; others at the opposite extreme, so coarsely lithographed as to be almost illegible; and many between these on each side of the average standard of the Indian Survey work, which, if it be fair to compare it with European topographical surveys and maps, is not a very high one.

The first of the new publications here is a long-expected General Map of India,[1] in two large sheets, on the scale of 64 miles to an inch, "compiled from the most recent topographical and revenue surveys, based on the Great Triangulation," distinguishing especially British territory from dependent and subordinate native states, showing railways and roads, and giving the heights in feet above the sea of many points, though no hills are indicated. The map is disappointing in its generally sketchy appearance, even in those portions of it which are reduced from detailed surveys, in the want of care which is often shown in the arrangement of the lettering, and in the absence of anything like thorough editing. In a note it is stated that—"The new orthography for the names of places in India not having been authoritatively sanctioned until after the plates of this map had been too far advanced towards completion, the old spelling was, therefore, of necessity adopted." It requires but a glance at the map, however, to see that no system of spelling, old or new, has been followed: on the contrary, we have here an elaborate representation of the utter confusion which has been created by the various systems that have been introduced to reform the Anglicised orthography of native names. For example, we have Mys*ore* and Tan*jor;* town names ending in *poor*, *pore*, or *pur* with the greatest impartiality; Ahmed*nuggur* on one part of the map, and Ahmed*nagar* on another; and the Pen *A.*, Vell*aur*, and Pan*ar* flowing down to the sea, side by side.

Four quarter-sheets of the Indian Atlas[3] are added,—two without hills, in preliminary form, and two in their completed state, one of these being a sheet of the year 1874, with additions to the end of last year. Laying these two finished sheets side by side, a want of harmony of design is at once apparent. In one the hill work is inexpressive, weak, and broken; in the other it is drawn in a quite different fashion, in bold, strong, conventional ridges. No doubt it is an exceedingly difficult matter to preserve a strict uniformity of style throughout the hundreds of sheets of a great work like this; but these are independent of one another in almost all respects excepting scale and size of sheet.

Two large sheets next follow, comprising a Map of the North Western Frontier, extending from the Upper Indus to Kabul,[4] made up from sheets of the Indian Atlas. Within the British frontier, and for some distance beyond it in most directions, this map is based on accurate surveys; beyond these the geography is sketched in from the compilation of various route surveys and reconnoissances towards Afghanistan. The most important line through this map, the line which it was no doubt designed to show in preference to any other feature, is that of the route into Afghanistan which leads from Attok, by Peshawur and the Khyber Pass, to Kabul. This is the official map, which would, no doubt, be issued to the army in the event of any movement becoming necessary towards Kabul. As a guide, however, it would be practically useless beyond the Indian frontier in this direction, and would, in all probability, prove to be positively misleading. It is scarcely credible that a map should be published by the Indian Survey Department in 1877 on which the geography of the route from Peshawur to Kabul is shown only as it was sketched in the route traversed by the Burnes' Mission in 1832. A series of parallel ridges, not one of which, we venture to say, is represented with any approach to accuracy, is shown running northward with great regularity from the Safed Koh to the Kabul River; there is not, however, the faintest indication on the map that there is a difference of level of more than 5000 feet between Peshawur and Kabul.

From the roughly zincographed, not very legible, and very coarse-looking maps of the Chittagong and Dacca divisions of Bengal,[5 and 6] it is a pleasure to turn to the really fine "Plan of the Sanitaria of Simla and Jutog"[12] in the Himalaya of the Punjab, surveyed and drawn by Captain George Strahan, R.E., 1872-74, a most charmingly artistic picture of the neighbourhood of these high-lying stations. This is the best piece of work that we have yet seen from India, a map of which the department may be justly proud, and which will compare advantageously with almost anything that has been done by European ordnance. Several of the new sheets of the Survey of Kumaon and British Gurhwal[13] present in an even more marked way than those of the Indian Atlas the want of consistency of design in carrying out the sheets of the same maps. Each year seems to bring a new and independent mode of execution. In sheet 20 of this map, which takes us to the very interesting region of the Nanda Devi and its dependent glaciers, feeding the source streams of the Ganges, the mountains are drawn in a manner so different from that which has been employed in sheet 7 of the same map, that the two can scarcely be recognised as parts of one design. Neither of them are good: in the former it is not easy to perceive that the dotted surfaces do really represent glaciers; there is nothing at all of the character of an ice stream in the symbol which has been adopted: it gives rather the idea of a sandy valley or dry river bed. The latter sheet is one of the worst specimens that we have seen of the one-inch scale maps, presenting a confused mass of hills, badly drawn in broken horizontal lines, in the midst of which it is not only extremely difficult to distinguish relative heights, but even to read the inscribed names of places or districts, so over laboured is the sheet with almost meaningless markings.

The new sheets of the Punjab Revenue Survey—Bhawulpoor State[15]—derive an interest from the extraordinary physical character of the barren country they represent, pitted all over with "toba" and "bhit," or "tibba" ponds and sand hills. A handsome map of the district of Ajmere,[9] in four sheets, is interesting in the same way, from the numbers of what we take to be artificial "bunds" across the streams, scattered thickly over the country, although an explanation of these, and of the dotted lines which, perhaps, mark divisions between the enclosed cultivated lands and the jungle, is deficient on the map itself.

The other maps noted beneath, which by their numbers testify to the active progress of the survey work, do not seem to call for special notice.

K. Johnston.

1. India. 1877. Scale, 64 miles = 1 inch. Two sheets.
2. India. 1877. Scale, 120 miles = 1 inch. Seventh Edition.
3. Indian Atlas. Scale 4 miles = 1 inch. Quarter sheets (preliminary). 52 N.W., 34 S.W., and 23 S.W. (finished). 131 N.W. (1874), with additions to 1876: 53 N.E. (1876).
4. North West Frontier—Peshawur. Scale, 4 miles = 1 inch. Two sheets.
5. Dacca Division. Scale, 8 miles = 1 inch.
6. Chittagong Division. Scale, 8 miles = 1 inch.
7. District Balasore. Scale, 4 miles = 1 inch.
8. District Monghyr (1845-46). Scale, 4 miles = 1 inch.

9. District Ajmere. Scale, 1 mile=1 inch. Four sheets.
10. District Mhairwara. Scale 1 mile=1 inch. Four sheets.
11. Province of Sind (1855 to 1870). Scale, 16 miles=1 inch.
12. Plan of Sanitaria of Simla and Jutog, Himalayan Mountains, Punjab (1872-74). Scale, 8 inches=1 mile.
13. Kumaon and British Gurhwal. Scale, 1 inch=1 mile. Skeleton sheets, 2, 8, 20, 22, 25, 38. Sheets, 7, 8, 9, 17, 20, 21, well shaded.
14. Lower Provinces Survey—District Sonthal Pergurmahs (1848-50). Scale, 1 mile=1 inch. Sixteen sheets.
15. Punjab Revenue Survey—Bhawulpoor State. Scale, 1 mile=1 inch. Sheets, 41 and 42.
16. Plan of Dera Ismail Khan. Scale, 6 inches=1 mile.
17. Plan of Rajunpoor—Dera Ghazi Khan. Scale, 6 inches=1 mile.
18. Plan of Gonda Khas. Scale, 8 inches=1 mile.
19. Civil Station of Gonda. Scale, 8 inches=1 mile.
20. Station of Nuggur Golaghaut. Scale, 8 inches=1 mile.
21. Plan of Sehore. Scale, 6 inches=1 mile.
22. Preliminary Charts of Beder Longitudinal Series. Scale, 4 miles=1 inch.
23. Minor Triangulation from the Coast Series—Masulipatam to Point Divy Lighthouse. Scale, 4 miles=1 inch.
24. Great Trigonometrical Survey of India—Levels in the North-west Provinces. Compiled from canal and railway operations. Several sheets.
25. Dehra Dun and the Siwaliks. Scale, 4 miles=1 inch. Sheets 14, 17, 18, 26, 27, 41.

Log Book.

——:o:——

Events in Peru.—The abortive attempt of Don Nicolas Pierola to disturb the peace of Peru, in the end of 1874, was described in our number for February 1875, p. 56. This year he has made a second attempt. His partisans Astete, Echenique, and the two young Carrascos seized the powerful iron clad ram 'Huascar,' at Callao, by a stratagem on May 6th, and took her down to Cobija, where Pierola came on board. On May 27th, the 'Huascar' appeared off Pisagua, which place was seized by the insurgents. Meanwhile the squadron, which remained loyal to the Constitutional President, General Don Mariano Ignacio Prado, left Callao on the 12th, steamed into the anchorage of Pisagua, and opened fire on the 'Huascar.' The squadron consisted of the iron clad frigate 'Independencia,' the corvette 'Union,' and gun boat 'Pilcomayo.' The iron clad ram 'Atahualpa' remained at Iquique. The 'Independencia' carries fourteen 70-pounders, and two 150-pounders. The 'Huascar,' a turreted ram, has two 300-pounders in her turret, and two 40-pounders. The fight continued for about two hours, and when darkness came on the 'Huascar' decamped, steaming north. On the 29th she encountered H.M.S. 'Shah,' bearing the flag of Admiral de Horsey, and H.M.S. 'Amethyst,' off Ylo. A summons to the 'Huascar' to surrender, on the ground that she had committed illegal acts on British vessels, was refused. The 'Shah' then opened fire, which was returned, and a very interesting action ensued. The English officers speak in high terms of the way in which the two brothers Carrasco fought and manœuvred the 'Huascar.' At dusk the 'Huascar' got out of action, ran down to Iquique, and surrendered to the 'Independencia' on the 31st of May. Thus Pierola was made prisoner.

On the 1st of June the Peruvian Ministry, consisting of Dr. La Rosa, Señor Garcia y Garcia, Don José Aranibar, General Manuel de la Cotera, and General Buendia, resigned. A new ministry was formed on the 6th under the presidency of General Buendia, with General Bustamante as Minister of War, Dr. José Felix Garcia of Finance, Dr. Morales of Justice, and Don Cirilo Rospigliosi of Foreign Affairs. The latter will probably have to conduct the negotiations consequent on the somewhat irregular action between the 'Shah' and the 'Huascar.' Señor Rospigliosi is the son of Dr. Don José Julio Rospigliosi, of Tacna, one of the most upright and learned judges that Peru has produced. The son is an able and accomplished lawyer, with no mean powers as a poet. His poem on the death of his father, in 1857, is a work of considerable merit.

Heights in the Bolivian Andes. — Mr. Minchin, the civil engineer who has been doing such useful geographical work in Bolivia, forwards the following heights, which he considers to be reliable, as resulting from his levelling for the railways between La Paz and Lake Titicaca. He is confident that the height of Illimani is within 10 feet of that given, and all are interesting, because former results depended on barometrical instruments.

Lake Titicaca	12,545	feet above the sea.
Alto de La Paz	13,389	,, ,,
Plaza Mayor, La Paz	11,946	,, ,,
Peak of Illimani	21,224	,, ,,

Pentland's height of Lake Titicaca was 12,795 feet, of Illimani 24,200, and of the Sorata (Illampu) 25,250. (See his paper *R. G. S. Journal*, v., p. 77 and 78, and p. 81.) But Mrs. Somerville gives Pentland's height of Illimani at 21,150 and of Sorata at 21,290 (*Physical Geography*, i., p. 158, *n.*), and Humboldt says that Pentland gave him the height of Illimani 21,145, and of Sorata 21,286.

FitzRoy made the Peak of Aconcagua, in Chile, 23,200 feet above the sea, increased afterwards to 23,910. But M. Pissis brings it down again to 22,296 feet. Humboldt's height of Chimborazo is 21,422 feet. After all, Aconcagua appears to be the highest peak of the Andes.

Russian Wintering Station in Novaya Zemlya.—During the last few years a marked decrease has taken place in the number of Russian vessels visiting Novaya Zemlya for fishing and hunting purposes, while the Norwegian vessels have every year become more numerous. In 1835 the number of Russian vessels amounted to 137, while in 1875 it had dwindled down to 5. The chief difficulty the Russians have to contend with is that the ports in the White Sea, from its secluded and land-locked character, become open to navigation later, and get frozen up sooner in the season than those on the Murmanian coast and the shores of Novaya Zemlya, which are exposed to the influence of the Gulf Stream. The spring and autumn, moreover, are the very times when hunting and fishing is most easily carried on. As the Russians thus generally find themselves three months behind their Norwegian brethren in the field, the Russian society for saving life has determined to form a special commission at Arkhangel, with the object of providing the Russians with the means of wintering with some degree of comfort, and with a sort of place of refuge in case of accident. The station house has been already built at Arkhangel, and will be conveyed by ship to Novaya Zemlya in the course of the summer, for erection close to the Malikarmakuli anchorage, in Moller Bay. The station consists of a two-roomed house, a bath room, a boat house, and a sort of observatory. The house rests on stone supports, has double walls, double flooring, and double ceiling. Each room is furnished with two good stoves, to burn wood ; the windows are thickly glazed, and barred with iron. The bath room is at a distance from the house, and is fashioned so as to serve as a dwelling house in case of fire occurring to the main building. Six Samoyede families will be conveyed to Novaya Zemlya this summer, with the necessary provisions, &c., to take care of the station. Experience of late years has proved that with careful observance of all necessary precautions, no danger is to be apprehended from wintering in Novaya Zemlya, desolate though the place be.

Colonel Prejevalsky.—The latest news of this traveller dates the 6th June, from a place called Olneus (?). His communication to the Imperial Russian Geographical Society is as follows :—"I have journeyed 200 versts east of Lob Nor. All the scientific labours have been crowned with success. I have captured three wild camels. All in good health. Will send you detailed account from Kuldja." In a letter, written from the Yoldus River, to the Govenor-General of Turkistan (probably about the same date), Colonel Prejevalsky states that the Chinese troops had, in April last, taken possession of the fortified pass of Devan, in the Tian-Shan, and of the Kashgarian towns of Toksun and Turfan.

Marseilles Geographical Society.—A new Geographical Society was inaugurated at Marseilles on the 6th of March last. A library and monthly *Bulletin* have been started, as well as a popular course of geographical instruction, to which the municipality and Chamber of Commerce have contributed subventions. A classified museum of geographical products will be organised in connection with the same, and ethnological and maritime sections will be added, if possible. Contributions to the amount of 20,500 have been received, and 295 members have already joined, a number which it is expected will largely increase. The President of the Society is M. Alfred Rabaut, ship owner, who for years has had an extensive connection with Zanzibar and Madagascar. M. de Lesseps is honorary President.

Volcanic Region in Eastern Persia.—Major Beresford Lovett was the first to point out, in 1871, the existence of an active volcano in the Sarhad Mountains, an unexplored tract north of Bampur, extending to the Afghan frontier. In this region there is an extinct volcano called Kuh-i-Basman, 10,000 feet above the sea, another 12,000 feet above the sea, called Kuh-i-Naushada; and Major Lovett received intelligence of an active volcano further to the north-east, and nearly south of Sistan, called Kuh Taftan. Colonel Macgregor and Captain Lockwood have recently made a journey through Khuzistan and Baluchistan to India, and Captain Lockwood distinctly saw the Kuh Taftan from a distance of about 40 miles. It is now covered with snow, and is in an active state.

This volcanic region of Sarhad is still unexplored, and is described as a lofty plateau above the region of palms, inhabited by nomadic tribes. The nearest approach to Sarhad from the north-west was made by Sir Frederic Goldsmid and Majors Beresford Lovett and Euan Smith in their journey from Bam to the Helmund in 1871. The nearest approach from the north-east was Christie's journey to the Helmund Valley. To the south the nearest approach was made by Pottinger in his journey from Nushki to Bampur. It would be a most interesting undertaking to explore the Sarhad plateau. The traveller might start from Jashak and proceed by way of Angaran, in Bashkurd, and Bampur ; and, if succesful, he would bring back most valuable geographical results. At the same time he might aim at tracing the still unknown course of the Bampur River.

Tea Trade in Bokhara.—Colonel Maief, during his recent journey in Bokhara, made some investigations into the question of the tea trade, and arrived at the conclusion that Russia could undertake to supply Bokhara with tea brought from Han-chow-fu, in China, by way of Guchen, Kuldja, Tashkent, Samarcand, and Katty-Kurgan, at a profit of about 37 per cent. on the present price of 50 roubles a *pud*, which is the minimum price of green tea in Bokhara.

Survey of the River Indus Mouth.—Lieutenant A. W. Stiffe, late I.N., surveyed the Indus banks in 1867, and, as extensive changes were known to have since taken place, he was deputed to re-examine the mouth of the river in March last. Lieut. Stiffe found that the Hajamro beacon had been moved (without any official notice being given thereof) about a mile and a half from its old site. He very properly animadverts on a practice so dangerous to navigation. An enormous extension of the banks off the Hajamro mouth was proved, amounting to $3\frac{1}{2}$ miles seawards, and in some places encroaching on the old ten fathoms contour. The Hajamro, which in 1867 was the fresh-water mouth, and the only navigable one, is now nearly closed, and the great body of fresh water enters the sea at the Jua or Sisa mouth, whither the pilots have all removed, nearly 10 miles northward of its former position. This great change has, according to the pilots, only taken place since last monsoon. The existing chart is not very correct, the large channel marked "River Indus" having no existence. The river, in fact, is so erratic, and such vast quantities of solid matter are brought down in suspension, that no chart can be depended on for long.

Lieut. Stiffe's survey was plotted on the scale of 10,000 feet to one inch ; the soundings were reduced to low water springs, Karachi datum, by a comparison of soundings alongside with the Karachi tide tables. A few soundings have been taken between Karachi and the river, but these do not testify to any great change, so that a re-survey does not seem urgent.

None of the "Pilots" or "Sailing Directions" give any particulars about the trade of the river, the following is therefore added by Lieut. Stiffe. The port of the river is Keti (mis-spelt Kellee on our charts), which stands on the left bank of the Hajamro, 10 miles from the present mouth, and has a population of about 2000. All sea-going vessels enter and clear from this place, to which point cargoes are brought down by flat-bottomed river boats, and then transhipped. The trade is chiefly grain. The navigating season is from the end of August to the end of May, the port being closed during the monsoon months. The total present sea-going trade is about 2400 vessels per season, amounting to 78,000 tons; the largest boats being a little over 100 tons, with a draught not exceeding 9—10 feet.

African Exploration Fund.—The Council of the Royal Geographical Society has taken steps to organise means for the systematic and continuous exploration of Africa; desiring at the same time that the proposed work should be in harmony with the efforts of the King of the Belgians in the same direction. The Council has assisted in establishing an "African Exploration Fund," to be appropriated to the scientific examination of Africa in a systematic and organised manner. To secure the appropriation of the Fund to the special objects for which it is raised, the Council has named a Special Executive Committee out of their body, with the President of the Society for the time being as Chairman. This Committee has invited support and co-operation from the public, and a meeting was held at the Mansion House on the 19th of July, the Right Hon. the Lord Mayor in the chair. The Council has headed the list of subscriptions with the sum of 500*l*.

The Special Committee has issued a circular announcing the objects of the Fund, and giving a list of routes in Eastern Africa that have been suggested for exploration. The circular is accompanied by a sketch map, designed to show how large a portion of Africa has been first explored by British travellers.

New Nubian Railway.—Dr. Schweinfurth has communicated to the *Exploration* some particulars respecting the construction of the Nubian Railway from Wadi-Halfa to El Ordeh in Dongola, the total length of which is to be 355 kilometres, one-tenth part being already completed. Below Wadi-Halfa the Nile is navigable to its mouth, and it is not at present proposed to connect Wadi-Halfa with Siut, the terminus of the Egyptian system. The Nile is navigable between El Ordeh, the terminus of the new railway, and Dobbeh, which is the starting point of caravans for Khartum and for Darfur; the new railway will thus prove of future importance in conveying the produce of Darfur and even Wadai to the Mediterranean, the latter having hitherto principally found its way thither by way of Bornu and Tripoli.

Portuguese African Expedition.—The two African explorers, Major Serpa Pinto and Captain Brito Capello, who had gone to Paris and London to obtain the necessary equipment for the geographical expedition to Central Africa, have already returned to Lisbon, and will start for Loando in the 'Zaire.' Major Serpa Pinto has had great experience in African exploration, having already made extensive journeys to Lake Nyassa, and to near the Victoria Cataracts of the Zambesi. M. A. De Abbadie, of Paris, has presented the explorers with a remarkable universal theodolite, made by Eighens, with an inverse action of his own invention, which he has called the "Abbas," and with which he determined the geodetical elevation of Abyssinia during the eleven years he spent in the exploration of that country; they also take a new apparatus, invented by Perry, of London, for the study of terrestrial magnetism; and among the sextants which they take there is one which is a perfect bijou: it is very minute and made of copper and platinum, by Laurien, and marks thirty seconds.

Correspondence.

QUERIES TOUCHING THE SCURVY REPORT.

To the Editor of the "Geographical Magazine."

Sir,—*In re* Arctic scurvy. Your valuable periodical, and the various pamphlets published on this subject, have materially modified many of my views. Can you kindly oblige me by answering a few queries?

Sir G. Nares is censured for not obeying the now well-known paragraph No. 11 of the Medical Director-General's memorandum. Paragraph 2 of this memorandum lays great stress on the men having 2 lbs. of meat daily to prevent "impairment of physical power," &c. The men did not have it. Query 1. Why does Sir G. Nares escape censure on this head? from its position and the stress laid on it, I should have thought it much more important than curt paragraph 11. It is true, Sir G. Nares says the men could not or would not eat 2 lbs. of meat daily. But he also says lime-juice could not be taken. His evidence is of no more value on one count than on the other. Query 2. If it is correct that the men would not eat it, as an old naval officer you can tell me if the crew could not be punished for presuming to think they had had enough to eat, when the Medical Director-General told them they had not? perhaps it is considered their suffering from scurvy is sufficient atonement, and justice is tempered with mercy. Query 3. Is there no later precedent for sudden outbreaks of scurvy than Anson's voyage, 1740, quoted page xiii. *Medical Report.* Page xxv. *Medical Report*, beef tea is strongly recommended as part of the sledge diet, "not only as a refreshing and invigorating, but also as an *anti-scorbutic article of diet.*" Query 4. Why was not this sent with the Expedition, as I presume it was as well known in 1875 as in 1877? Query 5. Why was not the pemmican made with lime-juice, as *now* suggested by the Medical Director-General? There are other suggestions on diet made by eminent medical men *now*? Why were they not made when they might have been useful? Query 6. Can you tell me if Admiral Richards, Mr. G. Murray, and Mr. Bayley, who did not take lime-juice are still alive? Science says they ought not to be. Science also says the former sledge journeys could not have been performed on the same diet as that of the parties of 'Alert' and 'Discovery,' and that facts have been kept back. Query 7. What are the suppressed facts? It is true Dr. Guy (5411) says he prefers "vulgar experience" to "any scientific data whatever," because reliance on the latter has frequently misled him. I have many other queries I should like to have solved; but cannot trespass further on your valuable space, so must submit myself,

Yours, truly,

Puzzled.

THE UZES, TORKS, OR MAGYARS.

To the Editor of the "Geographical Magazine."

Sir,—By your favour I have now examined three out of the four kinds of Turkish nomades, who lived in the Russian steppes in the days before the great Mongol invasion, namely, the Comans or Poloutsi, the Pechenegs, and the Berendeens. We still have left for consideration the fourth class, the most difficult, perhaps, and certainly the most interesting of the whole in our present inquiry. My view in regard to them is not the orthodox one. In fact, so heretical is it that I am somewhat diffident about propounding it. I will reserve my heresy, however, for the end of my letter. This class is designated specifically by Nestor, in his enumeration of the four branches of the nomades, as "*the Torks*" (*op. cit., ed.* Paris i., 253, 254). The chronicle which goes under the name of Nikon calls them *Tortozy*.

The name Tortozy I take to be a palpable corruption for Tork ozy, that is, the Uz Torks. This is very interesting, for the Byzantines, as we shall show presently, have several references to the Uz Turks, and Karamzin, from apparently quite a different reasoning, arrived also at the conclusion that "*the Torks*" of Nestor were the same people as those called Uzes by the Byzantines. "Les Uzes qui sont, sans doute, ceux que nos annales designent sous le nom de Torques" are his words in the French translation (ii., 86). Inquirers have generally confused these Uzes with Ghoz of the Arabs, and I have done so myself in a former paper, published in the *Journal of the Ethnological Society;* but it is quite clear to me, now, that this is a mistake; and that the mistake introduces much confusion into Turkish ethnology. The Uzes apparently gave their name to the Dniepér, whose Turkish name was Usu. Thus Von Hammer writes: "Den Dniepr, oder wie ihn die Tataren nennen, das wasser von Usu (Ocsakof) oder den fluss der Usen" (*Geschichte des Osman. Reich* iii, 421); and, long ago, Anna Comnena, speaking of the estuary of the Dnieper, tells us it was called Ozolimna, and was so named (she says) from the Hunnic race, who lived around it; for, she says, those whom we call Hunnic are commonly called Uzes, whence, she says, the place was probably originally called Uzolimna, and afterwards Ozolimna (*Stritter* ii., 947). Having analysed their name, we will now turn to their history, and quote all the passages in which their name occurs.

We read in the narrative of Constantine Porphyrogenitus that about fifty years before he wrote (*i.e.*, 894-899) the Uzi, in conjunction with Khazars, attacked the Pechenegs and expelled them from their country, which the Uzi afterwards occupied until his (Constantine's) own day. He adds, further, that some of the Pechenegs remained behind, and continued to live with the Uzi (*Stritter* ii., 938 and 939).

We do not meet with any mention of them, so far as I know, for almost a century, when in the year 985 we read in Nestor, "Vladimir, with his uncle Dobrinia, made an attack by water on the Bulgarians (*i.e.*, the Bulgarians of the Danube). He was supported by the cavalry of the Torks, which followed him along the shore (*op. cit.*, *ed.* Paris i., 122).

We have to make another great leap before we again hear of them, which is in the years 1049 and 1050, when we read in Cedrenus that the Pechenegs and Uzes were often at feud with one another (*Stritter* ii., 940).

In the year 1054 Nestor tells us that Vsevolod, Prince of Pereislavl, had a war with the Torks, whom he defeated, whereupon Bliush, the Prince of the Poloutsi, wished to revenge them and attack him, but he arranged matters with them (*op. cit.*, i., 200).

In 1060 Isiaslaf, Prince of Kief, with the Princes Sviatoslaf and Vseslaf, combined together and marched at the head of a great armament against the Torks, who were panic-stricken and abandoned their country, and many of them perished in their flight, from cold, hunger, and disease. "All," says the old chroniclers, "were struck with the Divine wrath, and Russia" (*i.e.*, the principality of Kief) "was rid of these idolators" (*Nestor* i., 201).

I cannot avoid the conclusion that the retreat of the Torks mentioned by Nestor was a part of the same story told us by the Byzantine Scylitzes under the year 1061. We are told that about that year the nation of the Uzes (who were a nobler race than the Pechenegs and the Scyths, *i.e.*, probably, in this place, the Hungarians) crossed the Danube with all their people and baggage upon long boats and pinnaces made from hollowed trunks and upon inflated skins. The Roman and Bulgarian guards opposed their passage, but were defeated; and their commanders, Basilius Apocapes, and Necephorus Botaniates, were made captive. The Uzes, we are told, in one account, numbered 60,000, in another 600,000, and they overran the low country on the Danube; a section of them advanced as far as Thessalonica, plundering and devastating. But the winter proved very severe, and the greater part of them perished, only a few returning to their main camp (*Stritter*, 941).

Constantine Ducas, who was somewhat famous for his avarice, was then Emperor of Byzantium. Although aware of the strength of the invaders, he grudged, according to some, an adequate outlay upon troops to oppose them, while others thought it was because he was afraid of their strength that he delayed action and sent envoys with gifts to their chiefs to treat. They apparently accepted his gifts, but continued their devastations in Thrace and Macedonia. The feeble Emperor collected a body of 150 men, with which he marched to a place called Choerob. News, however, soon after reached him that the greater part of the invaders had been decimated by the plague, and afterwards by the Bulgarians and Pechenegs; that the two frontier commanders who had been made prisoners had been released; and that the commander of the Uzes had retired beyond the Danube. After this disaster some of the Uzes submitted to the Emperor, and were granted settlements from the public lands in Macedonia (*Stritter*, *op. cit.*, 941-944). This expedition was, no doubt, as I have said, the complement of the migration from the banks of the Dnieper, mentioned by Nestor, and it was no doubt a fatal event in the history of the Uzes or Torks. Those who remained behind in Russia were only an unimportant section, and were more or less in the service of the Russian princes. It was two years after this that the Comans first appear in Russian history, and thenceforth occupied the role previously filled by the Torks and Pechenegs. The Uzes, who were settled in Macedonia, were similarly in the service of the Byzantine Empire. They are, in fact, qualified as "the Scythic mercenaries, that is, the Uzes," and "the mercenary Uzes." These notices occur during the reign of Romanus Diogenes, and a section of them, under a leader named Tame, is mentioned as having proved faithless to the Romans (*id.*, 944 and 945). They are again mentioned as auxiliaries in the Roman army in its struggle with the Pechenegs in the reign of Alexius I. Comnenus (1081-1118) (*Stritter*, 946.)

Let us now return once more to Russia. As I have said, the great migration of the Torks thence took place in 1060. It is curious that a year later the Poloutsi or Comans made their great attack on the principality of Kief—perhaps it was in revenge for the Russian campaign against the Torks. All of the latter did not migrate, a few remained behind; and we next read of them in the Russian chronicles in the year 1080, when we are told that, after making an attack on Pereislavl, they made an incursion into Russia (*Nestor* i., 226). Their chief town was Tortchesk, an appanage apparently of the principality of Kief, which was burnt by the Poloutsi in 1093 (*Nestor* i., 240). They afterwards laid siege to it. It is, doubtless, represented by Otchakof, near Pereislavl, on the Dnieper. It was bravely defended by its garrison of Torks; the besiegers determined to divert the river so as to starve out the garrison. The Torks appealed to Sviatopolk for supplies, which he sent; but they could not penetrate into the city, which was at last forced to open its gates. The town was terribly ravaged, and many of its inhabitants migrated (*ib.*, 243-245). About the year 1075 we find Torks mentioned as in the service of Vladimir, Prince of Chernigof (*ib.*, 247.) In the year 1097 we find a Tork, who is called a Tork Berendi, employed by the people of Sviatopolk to blind his rival Vassilko (*ib.*, 265). In the great defeat sustained by the Poloutsi at the hands of the Russians in the year 1103, we are told that the latter captured some Pechenegs and Torks in their camp (*id.*, 285).

In 1120, we are told the Torks and Berendeens abandoned Russia, and, after wandering hither and thither for some time, were entirely dispersed (*ib.* ii., 4).

In 1125, "the odious Turks" were in alliance with the Poloutsi against the Russians, but were driven by Yaropolk to take refuge in their town, *i.e.*, Tortchesk (*id.* ii., 10).

Two years later, a body of Torks is found in the force which the Grand Prince Mitislaf sent against the Krivitches (*id.* ii., 13).

About the year 1151, we read that the Berendeens, with rough kibitkas, and the Torks, with black coats, who were apparently in the service of Isiaslaf, assisted the latter to recover Kief, and, we are told, committed great ravages (*id.* ii., 70).

A year later, we read of Isiaslaf sending his son, Mitislaf, against the Poloutsi, at the head of a body of Berendeens, Torks, and Pechenegs (*id.* ii., 76).

The Torks are again mentioned in the service of Isiaslaf in 1154 (*id.* ii., 84).

In 1202, we read that the Black Coats (the Berendeens and Torks, *sic.*) assisted the Prince of Gallicia in an attack on Kief (*id.* ii., 175). This is the last mention I can find of the Torks in the Russian annals, and it would seem that they had become insignificant, and were then Russian subjects.

Having thus brought together the various notices of the Uzes or Torks, the question which remains is to inquire into their origin. The name Uzes, as I have said, is of small value for this purpose. The name Tork is more fruitful. It is very strange to our ears to find the name Tork or Turk used not generically (including all the various sections of the race, known to us, in consequence, as the Turk race), but specifically, as the name of a special tribe of the Turk race; and yet there can be no doubt that, as, in the case of the Mongols and other nomades, what was once the name merely of a tribe was extended when that tribe became famous to the whole race. It was certainly so with the Turks, and among the Chinese the name Tu kiu, which is their equivalent for Turk, was used specifically, there can be no doubt that, in early times, it was similarly used in the west by the Russian, Byzantine, and Arab writers.

The name Tork, as used by Nestor, is certainly specific, and contrasted with Pecheneg, Berendeen, etc., etc., other tribes of the same race. This assists us very much in our present inquiry.

When we first meet with the Uzes they were, as I have shown, in close alliance with the Khazars, and at issue with the Pechenegs. Now, on turning to the account of the first invasion of the Pechenegs, as recited for us by Constantine Porphyrogenitus, we find him saying that "the race of the Turks lived formerly near Khazaria, in a place called Lebedias . . . . through which flowed the river Khidmas, also called the Khingylus, and he tells us they were then called Sabartoasphali. They formed seven tribes, and had among them no king, either native or foreign, but certain Boebodi, of whom the first was called Lebedias. They lived for three years in close alliance with the Khazars, whose king gave their chief, Lebedias, a noble Khazar for a wife. . . . . The Pechenegs, having been defeated by the Khazars, deserted their country, and occupied that of the Torks; but a war having broken out between the Torks and the Pechenegs, the former were defeated and split into two sections, one of which was driven towards Persia and still retained the name of Sabartoasphali, the other section was driven westwards, under Lebedias, and found refuge in the district called Atelcusu" (*Stritter* ii., 609). I have no doubt myself that the Torks of Constantine Porphyrogenitus and the Torks of the Russian writers were the same people, and were the same also as the Uzes. The continuity between them is perfect. The common use of the name Turk, which was then used specifically, the common alliance with the Khazars, the common antagonism of each to the Pechenegs, and their occupation of the same area, are sufficient to show this; and yet how comes it that the identity has never, so far as I am aware, been before suggested. The reason, I take it, is that it involves a good deal more than appears on the surface. It involves, in fact, a reconstruction of our ethnographic notions—one also in which I must humbly take a part, for I have published very different views in former times. It involves, in fact, no less a notion than the making of the Magyars of Hungary Turks, for there can be no doubt that the Turks of Constantine Porphyrogenitus were the Magyars of Hungarian history. Were the Magyars, then, a Turkish race? I now believe so most implicitly. This does not mean, of course, that the Hungarians are all of Turkish race. Their language and antecedents are mainly Ugrian and not Turkish; but it means that the race of conquerors who invaded Hungary in the end of the ninth century, and who gave the inhabitants of Hungary a new name, namely, that of Magyar, were Turks and not Ugrians. It means that we must separate the Hungarians proper from the Magyars, just as we separate the Hungarians from the Turkish Comans, who so largely occupied Hungary in the thirteenth century, and whose language and other idiosyncrasies have also disappeared and been swallowed up by the Ugrian element of the population. My view is, then, that the Magyars were, on a larger scale, what the Comans were on a smaller, namely, a tribe of Turks who conquered a population of Ugrians. These Ugrians, I take it, were the descendants of the Huns and Avares, who so largely settled in Pannonia.

It has been the fashion of late years to ignore the descendants of these great races as if they had become extinct when Arpad and his Magyars entered the country, but such a view is entirely erroneous. The wars of Charlemagne against the Avares were no doubt savage wars, and destroyed many of them, but they were neither so savage nor so prolonged as his wars against the Saxons; and we know very well that he was far from extirpating that independent race. Nor is it at all likely that he should have performed this feat in regard to the Avares. We know, as a fact, that he did not do so; and although the notices of Pannonia between the time of his death and the invasion of the Magyars are scanty, they are sufficient to prove this; thus, we read under the year 822, in the life of Louis the Pious, that in that year the Avares sent an embassy to the Emperor (*Vita Hludoviici Pertz* ii., 627; *Eginhardt's Annals*, *id.* i., 209); while we read in the *Annales Juvavenses* under the year 873:—"Hunni Romanos et Gothos atque Gepidos de inferiori Pannonia expulerunt et illam possederunt regionem, quoad usque Franci et Bagoarii cum Quarantanis continuis affligendo bellis superaverunt eos autem qui obediebant fidei et baptismum sunt consecuti, tributarios fecerunt regum, *et terram, quam possident residui, adhuc pro tributo retinent regis usque in hodierum diem*" (*Zeuss*, 741). Again, not only do the traditions about Attila still survive among the Hungarians, as has been so well shown by Thierry, but the Seklers of Transylvania—very Hungarians of the Hungarians—are especially named by the Notary of King Bela under the name of Siculi, and he tells us they were descended from the followers of Attila (*Zeuss*, 756). Other evidence might easily be adduced, but this will suffice to show that both Huns and Avares were largely represented in Hungary when the Magyars invaded it and to support my contention that the Ugrian element among the Hungarians is derived from them.

Let us now turn to the direct evidence for making the Magyars Turks. Rubruquis, as is well known, deduced the Hungarians whom he knew from Pascatir, *i.e.*, Bashkirland. Now the Bashkirs are very typical Turks. Not only so, but, as the Baron D'Ohsson long ago showed, the names Bashkir and Magyar were equivalent terms among the early Arabs. Thus, Maçudi calls the Magyars Bashkards. Ibn Haukal says—"There are two Bashkard nations, one in the extreme west (it ought to be east) beyond the Bulgarians, to whom they are subject. *The other, more numerous, lives near the*

Pechenegs. Like the latter they are Turks, and live near the Roman Empire (*Voyage of Abul Cassim*, 257). The geographers Yakut and Kazvii similarly speak of the Magyars as Bashkirs. A considerable extract from the former has been translated by M. Renaud (*Abulfeda*, ii., 294), which is very curious, inasmuch as it speaks of a colony of Bashkirs as settled *among the people called Hungarians*. Ibn Said is quoted by Abulfeda as making a similar assertion (*id.* ii., 312), and also as describing the advance of the Tartars against Sebenico, and of their having been defeated there by a combined army of Hungarians, Bashkirs, and Germans (*id.*, and Yules' *Marco Polo*, 2nd ed., ii., 493, note). Ibn Said in another place very distinctly identifies the Bashkirs, whom he calls Turks, with the Magyars (*Abulfeda*, 294). Juveni, in describing the Tartar invasion, uses the name Bashkir for the Hungarians, and in a note to the passage (*Histoire des Mongols*, ii., 620) D'Ohsson adds that among the Turks *b* and *m* are letters so generally confounded that the names Bashkir and Magyar are, in form, almost the same. Rashid uses the name Bashkirs in the same way as Juveni (*id.* ii., 621). Khondemir does so also (*Journ. Anal*, 4th series, xvii., 110). In remarkable confirmation of the arguments here used we find Abulfeda describing the country of the Bashkirs proper as the land of the Majars, situated in the north of the seventh climate. He calls them a Turkish race, living, according to some authors, between the Pechenegs and the Sekek, in the land of the Bulgarians (*id.* ii., 324).

These various passages make it clear that the Magyars were, in fact, merely a branch of the Turkish Bashkirs. On turning, again, to the account of Constantine Porphyrogenitus, we find him describing the Turks as being divided into two sections, one of which retired towards Persia—that is, retired towards the Caucasus. Now, we find that on the banks of the Kuma there are still ruins of a famous mediæval town and mint of the Golden Horde called Majar or Kumajar. Many writers have viewed in this town a distinct trace of the occupation of the Magyars. Klaproth argued on the other side, on the ground that the name had a *Turkish* etymology, and the remains were of Turkish character. This exactly agrees with our contention, and makes it exceedingly probable that the town of Majar does, in fact, represent the division of the Turks which retired towards Persia. I may mention that Von Hammer names a castle of Majari in Irak Arab, which he connects with the same migration (*Golden Horde*, 290); so that a section of the race probably got as far as Persia proper.

There are some broken tribes of Turks in the Caucasus, whose traditions further illustrate our subject. These are the Basians and Karatshi. Of the former, Klaproth says:—"Their elders report that they were long ago settled on the steppe of the Kuma as far as the Don, but at what particular time they are unable to state. Their capital, which is said to have been very magnificent, was named Kirk Majar, which in their language means the forty stone buildings, or the forty four-wheeled waggons, according to the twofold interpretation that may be given to Majar. They assert that the ruins of Majar which yet subsist are the remains of this city. Here lived several of their princes, who at the commencement of the Hegira lived at constant enmity with their neighbours, and were at length expelled by them, on which they retired to the great Kabardah, whence they were in the sequel driven by the Circassians" (Klaproth, *Caucasus*, 281). In regard to the Karatshai (? Kara Uzes or Black Uzes), he says:—"They assert that they removed from Majar to the district they at present inhabit before the Circassians came to the Kabardah" (*id.* 284).

It is further remarkable, as part of the same contention, that, as Colonel Yule has pointed out, a tribe Majar is associated by Shereffeddin and in the Masalah al Absaa, in the one case with the Alans, and in the others with Circassians, Russians, and As or Alans, that is, with the country of the Caucasus (*Marco Polo*, 2nd ed., ii., 492).

Now, the Emperor Constantine tells us the section of the Turks which retired towards Persia was called Sabarto Asphali. Zeuss explains the first half of the name as black, connecting it with the Teutonic *swart* or *Schwarz*. Kara Atshi means Black Atshi, so that the names Kara Atshi and Sabarto Asphali are to some extent connected. The former of these names is apparently a form or corruption of Black Uzes.

Thus, whichever way we test our problem, we arrive at one conclusion, namely, in making the Magyars a race of Turks, now represented most purely by the Bashkirs and the Turks of the Caucasus. There seems to me to be only one argument on the other side, and that is the fact of the names of the Magyar chiefs having been of other than Turkish origin, but this is only a superficial difficulty.

The names, so far as we can judge, were of the same class as those of the Bulgarian leaders, and the Bulgarians and Khazars, as we know, were either identical or closely related tribes. Now we know also that from the seventh to the tenth century the Khazars were dominant in all the steppes of Southern Russia, and that it was from them the chief culture of that region was derived. We know the close connection there was between the Turks of Constantine and the Khazars, and how several tribes of the latter went over and joined the former. If we knew more of their history, I have no doubt that we should find that their chiefs, who were not kings, but are described by the Emperor-author under the Slavic title of Boebodi, or Voivodes were supplied to them by the Khazars. It was probably from the Khazars that the Hungarians derived their costume and many of their customs, and it is by no means impossible that the Hungarian huzzars derived their name from the Khazars. So that I look upon the Magyars as a race of Turks, governed by Khazar princes, and more or less their dependents.

This view is, I believe, new; and I believe it clears up and renders plain one of the most perverse riddles in the ethnography of Eastern Europe. I should feel very grateful for any criticism or new light on a question which is of prime interest to all who wish to unravel the tangled web of early European ethnography.

Yours, &c.,

Derby House, Eccles. Henry H. Howorth.

Proceedings of Geographical Societies.

—:o:—

ROYAL GEOGRAPHICAL SOCIETY.

Meeting of 25th June, 1877.

Sir Rutherford Alcock, President, in the chair.

Mr. A. R. Wallace delivered a lecture (the third of the Session) on

The Comparative Antiquity of Continents, as indicated by the distribution of Living and Extinct Animals.

The Lecturer commenced by observing that much of the interest attaching to geography was centred in the general distribution and the peculiarities of animal and vegetable life in different countries. Each continent, each island, and, generally, every tract of land, marked out by natural boundaries, is distinguished by a more or less peculiar flora. It was soon ascertained that some of the facts of distribution were due to diversities of climate, altitude, and geological structure; others were accounted for by barriers to the migration of organisms, such as oceans, seas, mountains, deserts, &c. The discoveries of Lyall and Darwin, who elucidated the gradual and never-ceasing changes—(firstly) in the physical conditions and mutual relations of the land surfaces of the globe, and (secondly) in the forms and structures of all organisms, added most materially to our knowledge of this subject.

Having tested the application of truths in a variety of critical cases in his recent work, Mr. Wallace considered himself justified in applying the same rule inversely, and making these facts of distribution yield information as to the changes in geography which have produced them. One great peculiarity of the distribution of land lies in its freedom from complete isolation. It is possible, the lecturer remarked, to travel from the extreme north of Asia to Cape Horn, Cape of Good Hope and Tasmania, without ever going out of sight of land. The continents, indeed, resembling as they do a huge creeping plant, with roots, at the North Pole, and the matted stems and branches of which cover a large part of the northern hemisphere and send three great offshoots toward the South Pole, offer great facilities for the transmission of varied forms of animal life. There is evidence to prove that during the greater part of the Tertiary period the relative positions of our continents and oceans did not greatly differ from their present forms, and the former, back to the ime of the Devonian formation, were never so completely submerged as to be replaced by oceans comparable in depth with our Atlantic or Pacific.

The Lecturer then proceeded to sketch out the zoological features of the six great biological regions. These are as follows: the Palæarctic or North Temperate region of the Old World, the most extensive and probably most ancient of all. It includes the whole of Europe, by far the largest part of Asia and a considerable tract of North Africa. It is characterised by a considerable number of typical groups, although in recent geological times it has lost much of its ancient richness and variety of animal life. The Ethiopian region, consisting of Africa south of the Tropic of Cancer with Madagascar, is of comparatively small area, but its tropical character has endowed it with a greater richness of large animals than any other part of the globe of equal extent. The Oriental region comprises all tropical Asia east of the Indus, with the Malay Islands as far as Java, Borneo, and the Philippines. Its present area is smaller than any other except the Australian, but it was doubtless at no distant epoch connected with Indo-China, and was then not much smaller than the Ethiopian region. There is a great variety of birds and insects here, though the mammalia are few in number.

Going back to the Miocene Age, we find that the deposits which occur in France, Hungary, Greece, North-western and Central India, in Burma and China agree generally, and point to the fact of this great continent having been then as now one continuous land.

The early Tertiary deposits over the Sahara, and parts of Arabia, Persia, and Northern India, point to the fact that a sea or strait extended from the Bay of Bengal to the Atlantic Ocean, thus cutting off the Peninsula of India, with Ceylon, as well as all tropical and South Africa, from the great northern continent. There is, therefore, good evidence that the great Euro-Asiatic continent of Miocene times exhibited in its fauna a combination of all the main features which now characterise the Palæarctic, Oriental, and Ethiopian regions; while tropical Africa and the Peninsula of India, possessed a much more limited fauna, consisting mainly of animals of a lower type, and more characteristic of Eocene or Secondary times. If this view be correct, the great mammalia, now so specially characteristic of Africa, are all comparatively recent immigrants, who took possession of the country as soon as an elevation of the old Eocene and Miocene sea-bed afforded a passage from the southern borders of the Palæarctic region. This event probably occurred about the middle of the Miocene period.

Our knowledge of the geology of Africa is not sufficient to enable us to determine its earlier history with any accuracy. Madagascar was certainly once united to the southern part of the continent, but it is clear that its separation took place before the great irruption of large animals just described. In South-temperate Africa the peculiar forms of mammalia, birds, and insects, with the wonderfully rich flora of the Cape of Good Hope, point to the former existence of an extensive south temperate land, in which so many peculiar types could have been developed.

At the time that Tropical and South Africa were so completely cut off from the great northern continent, the Peninsula of India, with Ceylon, was also isolated. Another remarkable change has taken place in Eastern Asia in Tertiary times. There can be no doubt the Sunda and Japan Islands formed southern and eastern extensions of the continent. The Philippines and Celebes, perhaps, also formed a part of this continent, but became separated earlier. Between India and Malaya and Madagascar there has been communication; but as this is proved chiefly by resemblances in birds and insects, it may be accounted for by the former existence of a western extension of India and lands in the Indian Ocean, indicated by the Laccadives, Maldives, Seychelles, and Chagos group. With reference to the existence of a Lemurian continent, Mr. Wallace considers there is no sufficient evidence to warrant such a supposition, though undoubtedly the lemurs are a type of great antiquity and wide range.

The mammalia of the Næarctic region, or temperate North America, are not very numerous, and can for the most part be divided into two groups—one allied to the Palæarctic and the other to the Neotropical fauna. In the Neotropical region, comprising all South America and the tropical parts of the northern continent, we find that the Old World types have still further diminished, while a number of new and peculiar forms have taken their place—mammalia, birds, reptiles, &c., so that South America presents, on the whole, an assemblage of curious and beautiful natural objects, unsurpassed—perhaps even unequalled—in any other part of the globe.

There are distinct proofs that in the Post-Pliocene (corresponding nearly to the Post-Glacial period and to that of pre-historic man in Europe), the Pliocene, Miocene, and Eocene periods, the interchange of large mammalia between the Næarctic and Palæarctic regions was far more easy than now. This interchange may have taken place either where a comparatively shallow sea now exists, between Norway, Iceland, Greenland, and Arctic America, or by way of Behring Straits. The past history of the North American fauna is complicated also by a set of migrations from South America, which occurred at the end of the Pliocene or beginning of the Post-Pliocene epoch. The remains of this epoch found in Brazilian caves show us that the fauna of South America immediately preceding that now existing was much richer in large mammalia, and probably in many other forms of life. The inter-migrations which have undoubtedly taken place between North and South America favour the notion that the two continents have developed fauna of their own, and so must have been separated by straits connecting the Pacific and Atlantic Oceans—a fact further borne out by the similarity between the mollusca of the Pacific coast and that of the Caribbean Sea. Among changes which South America has undergone, perhaps the most important has been its separation into a group of large islands—a fact shown by the immense area and low elevation of the great alluvial plains of the Orinoko, Amazon, and La Plata. A shallow strait may have then separated the highlands of Guiana and Brazil from the Andes, and the balance of land may have been restored by an elevation of the now submerged east coast for several hundred miles, embracing the Falklands, and reaching far to the south of Cape Horn.

Australia, with New Guinea (which has in recent times been united with it), is characterised by the lowly organisation of its mammalia, the marsupials, which alone prove that Australia must have remained almost or quite isolated during the whole of the Tertiary period. In the Oolite and Trias formations remains of marsupials have been found closely resembling remains of similar age in North America. At this early period immigration from the northern continent may have taken place, but there is no probability of any connection having since existed. After summing up the general conclusions regarding the former geographical distribution of sea and land in the different quarters of the globe, which a study of the present and past fauna leads us to, Mr. Wallace brought his lecture to a conclusion.

The PRESIDENT made some eulogistic remarks on the value and interest of Mr. Wallace's researches, and after noticing the presence of his Majesty the Emperor of Brazil, who had honoured the meeting with his attendance, announced the Society's meetings adjourned till the following November.

IMPERIAL RUSSIAN GEOGRAPHICAL SOCIETY.

Monthly Meeting of April 6th (18th), 1877.

M. P. DE SEMENOF, Vice-President, in the chair.

The SECRETARY announced the death, at Vienna, two days previously, of M. Barbot de Marny, a Geologist, whose chief works were the production, in conjunction with M. de Helmersen, of a geological map of Russia in 1861; and, in 1862, a remarkable geological and orographical study on the Kalmuck Steppe, for which the Society awarded him the Gold Medal and the title of Corresponding Member. Since then M. de Marny had taken an active share in the labours of the Society, his last work being the geological examination of the Amu Daria country in 1874, the results of which he was engaged upon at the time of his death.

The most recent news respecting Colonel Prejevalsky (see our present number, p. 216) were then communicated by the Secretary.[*] Captain Pevtsof, who during last summer had taken various geodetic observations for a distance of 845 versts between Zaissan and the Chinese town of Guchen, and had made zoological, botanical, and mineralogical collections, was on the point of completing the account of his labours, illustrated by a map of North-west China on the scale of 40 versts to an inch.

The Society is at this moment organising two expeditions, one to make ethnological researches among the Finnish population of the Volga, and the other to explore the fluvial highways of Siberia. M. Mainof, the officer in charge of the first expedition, was to have started on the 20th May. The second or Angara Expedition has been enlarged in its scope, by M. Sibiriakof having promised a grant of 2000 roubles (in addition to 5000 roubles already given by him) towards the cost of the examination by the expedition of the water-partings between the Ob and Yenissei, in the direction of the Ket River, and between the Yenissei and Lena, by way of the Angara and Ilim Rivers. If, on investigation, it should prove practicable to unite these great water systems, the benefit that would accrue by joining the north-west confines of China with Russia in Europe by a continuous waterway would be incalculable.

Announcement was made of the formation of the Russian Committee in connection with the Belgian project for the exploration of Africa, and the names of General A. Makscheief and Baron F. d'Osten Sacken were mentioned as having been elected members.

M. VOIEIKOF gave an account of his recent travels in Japan during the summer of 1876. He stated that there are two lines of railway in Japan, one about 20 miles long from Yokohama to Yeddo, and the other about twice that distance from Kiogo by way of Oossaka to Kioto. There are also several Japanese lines of steamships, the chief of which unites Yokohama with Nagasaki and Shanghai. These lines are in the hands of companies, who receive a large subvention from the State. There are also many small steamers which ply in the Gulf of Tartary. There are very few roads practicable for carts throughout Japan; the *jirukisha*, a small carriage drawn by a man at a pace of about five miles an hour, is a favourite mode of locomotion along fairish roads; where this is impracticable, travellers use palanquins or ride on horseback. There is a remarkable uniformity in the manners and customs of the people throughout the country, notwithstanding the size of the country, the difficulties of communication and the great dissimilarities of different provinces. The northern part of Nipon is much more scantily peopled than the southern. In the valleys, where irrigation and rice culture are practicable, the population is dense, and agriculture is very forward; but the mountains, on the other hand, are sparsely inhabited and covered with thick forests. M. Voieikof gives it as his opinion that Japanese manufactures have deteriorated since the immigration into the country of Europeans; and that as the people strive to make money quickly, their work lacks the artistic character and careful finish it formerly had. M. Voieikof furnished the society with a list of 600 barometric heights he had taken.

ITALIAN GEOGRAPHICAL SOCIETY.

May 24th, 1877.—At this meeting Signor CORA, of Turin, held a public conference on the subject of the existing maps of Turkey in Europe, which he justly deemed at the present moment a topic of supreme interest. The best maps were, he said, those of Scheda and of Kiepert, that of the latter being the most minute and full of information—a perfect marvel of geographical labour, executed by himself alone. M. Kiepert told Signor Cora that a new edition would shortly be issued of this map, and begged that he, Signor Cora, would be so good as to afford him all possible information with regard to the Epirus, visited by the latter in 1874, and again in 1876. Signor Cora spoke of the whole peninsula with great clearness and precision; alluded to the various races, and to the chief geographical works treating of those parts. He stated that Turkey itself might be said to possess no territorial maps. He described Albania with the accuracy of one who had personally visited that province. According to Signor Cora's opinion, the chief cause of the long, interminable marches made by the Russians is this want of local charts, the many unknown places they come to, and the want of roads.

Signor Cora's discourse was very much applauded by the meeting.

NOTICE.

The Office of THE GEOGRAPHICAL MAGAZINE *is at* 57 *&* 59, *Ludgate Hill, E.C.*

Annual Subscription and Postage, *£*1, *Inland. Foreign Orders must be accompanied by P.O.O. or Cheques to include the full amount of Foreign Postage. Post Office Orders to be made payable to Messrs. Trübner & Co.*, 57 *&* 59, *Ludgate Hill, London, E.C.*

---

[*] The two versions of the telegram are identical, with the exception of the interesting additional fact mentioned in the last, that Prejevalsky had hunted and bagged some wild camels in his sojourn in the Lob Nor country.

THE

GEOGRAPHICAL MAGAZINE.

SEPTEMBER, 1877.

CONTINUANCE OF ARCTIC RESEARCH.

I.

Routes for Future Arctic Expeditions.

The arguments for the continuance and completion of Polar discovery are the same as those for its renewal. If Her Majesty's Government considered that the encouragement of maritime enterprise, and the exploration of the Polar Region were objects of sufficient importance to justify the despatch of an expedition, to commence that work in 1875, those objects still exist, and the arguments for continuing and completing the work are quite as strong in 1877 as they were in 1875. Indeed, the success of the Expedition of 1875-76, and the experience gained by it, give new strength to those arguments; while the recent discoveries add fresh interest to Arctic research, and give additional scientific importance to its completion.

The discovery of the Palæocrystic Sea, and of 300 miles of its desolate shores, has entirely altered preconceived ideas, and added materially to our knowledge of the Polar area. But this increased knowledge is still very partial, and one of the most interesting objects of future research will be to ascertain the extent of the sea of ancient ice, and the laws which regulate its formation.

The knowledge acquired in 1875-76 fully confirms the accuracy of the rules for Arctic exploration which are based on long experience, and were formulated by Sherard Osborn in 1865. These are—1. Navigate along a coast line, and avoid drifting pack. 2. It is necessary to pass at least one winter at a point beyond any hitherto reached. 3. The ship is merely the base of operations, and sledges are the main instruments for exploration and discovery. The necessity for navigating along a coast line in order to cross the threshold of the unknown region, has received additional confirmation, the valuable results brought home by Captain Nares could not have been secured without wintering in the ice, and the use of sledges for exploring and making discoveries has again been shown to be indispensable. It is, therefore, established that the rules which guided Sherard Osborn in selecting Smith Sound as the best route and in recommending the course to be pursued, must still be considered in full force as guides for the selection of the next best route, and for laying down the principles on which Polar research should be continued.

It is now more certain than ever that the course advocated in Dr. Petermann's letters of 1865, namely, that of attempting to enter the drifting pack north of Spitzbergen in a steamer, in the hope of reaching a very high latitude, must be finally discarded. In the first place, the object is insufficient. Few of the results desired from Arctic exploration would be obtained by a summer cruise of this kind, away from land, even if it was successful. In the second place, all practical navigators who have undertaken scientific investigations in the Spitzbergen seas since 1865, including Nordenskiöld, Koldewey, Payer, and Lamont, have declared that it will not be successful. Lieutenant Payer, entirely coinciding with Professor Nordenskiöld, holds that navigation in the frozen seas remote from the land, is far more dangerous than navigation along a coast line, that it is entirely dependent on accident, exposed to grave catastrophes, and without any definite goal. "All the unsuccessful attempts," he adds, "to penetrate northward from Spitzbergen, were made by expeditions whose course and termination resemble each other as one egg resembles another." Payer repeats what Sherard Osborn had urged since 1865, and what ought now to be accepted as an incontrovertible canon of ice-navigation. In the words of Sir Edward Parry, "experience has clearly shown that the navigation of the Polar seas can never be performed with any degree of certainty, without a continuity of land. It was only by watching the openings between the ice and the shore that our late progress to the westward was effected (in 1819), and had the land continued in the desired direction, there can be no question that we should have continued to advance, however slowly, towards the completion of our enterprise."

We must, therefore, continue to be guided by those canons of Arctic exploration which Sherard Osborn has formulated. But it must be remembered that the Smith Sound route was selected because it was the best by which the threshold of the unknown region could be approached. The work in that direction is now completed, and the next best route cannot, of course, offer the same chances of success and equal advantages. The difficulties will increase as the work approaches completion; but so will the glory of surmounting them.

Four routes now remain for future expeditions. 1. The Jones Sound route, the work of which will be to connect North Lincoln with Aldrich's farthest, and to ascertain the limits of the Palæocrystic Sea in that direction. 2. The East Greenland route, to connect Cape Bismarck with Beaumont's farthest, and so complete the discovery of Greenland. 3. The route of Franz Josef Land, to explore the northern side of the country discovered by Payer; and 4. The North-east Passage, by which a knowledge of the sea north of Siberia will be completed, and Wrangell Land will be explored.

The two latter routes will probably be found the most difficult, and it is not likely that all the work in either of those directions could be completed by one expedition. Payer and Weyprecht only reached the land discovered by them in 1873, by dint of a long and involuntary drift in the ice. It might be reached by a fortunate and skilful attempt either by the north coast of Spitzbergen, or to the eastward, according to the season. If a winter harbour could be reached on the western shore of Franz Josef Land, discoveries of great interest would be made by sledging parties, and annual communication might be secured by forming depôts on Gilies Land, and other islands probably intervening between North-east Land and Zichy Island. Franz Josef Land seems to be a part of the Spitzbergen group, rising out of the same shallow sea, with deeper water to the north. The exploration of its northern face will be very interesting, and will throw much light on the physical geography of the still unknown portion of the Polar area.

The North-east Passage is surrounded with a halo of romance. It was the first achievement attempted by our earliest Arctic worthies and by the Dutch, and is connected with the names of Willoughby and Chancellor, of Pet and Jackman, of Barents and Linschoten. In later times the labours of Lutke, Nordenskiöld, Gardiner, Wiggins, and the Norwegian walrus hunters have given fresh interest to its approaches; the journeys of Anjou and Wrangell have shown the great geographical interest which attaches to the sea north of Siberia; while the admission of an indication of Wrangell Land on the charts has made its complete exploration a necessary work for the future.

Since 1869 the voyages of Norwegian fishers have overcome the obstacles on the threshold of the North-east Passage, which were insuperable to the early navigators. They have sailed round Novaya Zemlya, and have traversed the Kara Sea. The point is to select the right time in the season for an attempt to cross the Sea of Kara. It has now been established by M. Nordenskiöld and Captain Wiggins that a steamer may always calculate upon being able to reach the mouth of the Yenisei River in August. It remains to be seen whether navigation can be extended round Capes Taimyr and Chelyuskin to the northern shores of the New Siberian Islands. Russian vessels have never been able to get beyond the mouth of the Pyasina. But in 1843, Middendorf saw extensive open water from Cape Taimyr during the summer, and the observations of both Anjou and Wrangell tend to the conclusion that, if Cape Chelyuskin could be rounded, the Polar Sea north of Siberia might be navigated as far as Wrangell Land. The difficulties of crossing the threshold of the unknown region, and reaching new ground by this route, will doubtless be formidable. Nevertheless, important discoveries will reward the future explorer who boldly and successfully advances northwards on this line. He will be in the rear of the ice-laden Polar Sea discovered by the Expedition of Captain Nares, and will thus complete the solution of the questions in physical geography connected with it.

It is, however, the two first routes that I have mentioned which offer the greatest advantages, and most nearly comply with the conditions that have been laid down, namely, those by Jones Sound and by the east coast of Greenland. By both the navigation would be along coast lines, and by both there is a reasonable expectation of being able to establish a base of operations beyond the threshold of the unknown region. Discovered by Baffin in 1616, Jones Sound is said to have been penetrated by Captain Lee in the 'Prince of Wales' whaler in 1848, for a distance of 150 miles. In August 1851, Sherard Osborn went a short distance up Jones Sound in the 'Pioneer,' but was stopped by floes stretching across the strait; and it was also entered by Inglefield, in the 'Phœnix,' in 1853. In the spring of 1853, Sir Edward Belcher explored the north coast of Grinnell Land, which forms the southern side of Belcher Channel leading from Jones Sound. He found open water streaked with sailing ice, and the northern coast or islands trending to N.E. The floes were acted upon by a strong tide, and had evidently been in motion during the previous autumn. Early in June the flights of birds indicated water holes to the north, probably caused by the passage of a strong tidal wave in an east and west direction. The geographical results of an expedition up Jones Sound and Belcher Channel would be the completion of discoveries thence to Aldrich's farthest, including the distribution of land and sea towards Prince Patrick Island, and the character of the region north of the Parry group. The attainment of a suitable base of operations for the sledging journeys is almost certain, so that some measure of success by the Jones Sound route may be relied upon.

But, with equal advantages as regards the chances of success, the East Greenland route offers geographical results of greater importance, namely, the completion of the discovery of that vast mass of glacier-bearing land. The northern known part of East Greenland was discovered by Henry Hudson on June 13th, 1607, who called it "Hold with Hope," and reported that "for aught we could see, it is like to be a good land and worth the seeing." This was in latitude 73° N. Van Keulen, on his chart, has "Land van Edam" in 77° 10′ N., discovered in 1655; and another part of the coast, seen in 1670, marked "Land van Lambert." In June 1822, Scoresby forced his ship through the ice floes which encumber the east coast, and surveyed it from Gale Hamkes Bay in 75° southwards to 69° N., finding little difficulty in sailing along the channel close in shore. In the following year, also, during the month of June, Captain Clavering in the 'Griper,' with Captain Sabine on board, attempted to press through the ice to the east coast of Greenland in 70° 30′ N., but was stopped by an unbroken field sixty miles long. On August 2nd, he again entered the ice in 75° 30′ N., and passed through sailing ice, along the margin of solid fields, to the south-west, at last succeeding in reaching the land. He laid down the coast line from 72° to 76° N., while Captain Sabine took his observations on Pendulum Island.

The German Expedition sailed from Bremen on June 15th, 1869, consisting of the 'Germania,' a little steamer of 140 tons and with a crew of seventeen men, and the 'Hansa' storeship. The crew of the 'Hansa' demonstrated the existence of a southerly drift along the east coast during the winter, while the 'Germania,' following in Captain Clavering's footsteps, reached a latitude of 75° 30′ N., and wintered at the Pendulum Islands in 74° 30′ N. By the 5th of August the 'Germania' reached open water in shore, but the ice appeared to be firm and without sign of breaking up, to the north of Shannon Island (74° 56′ to 75° 26′ N.). To the south there was much open water. From August 17th to September 13th an attempt was made to go farther north, but without success, the fields being closely packed against the land ice. In 1870 a sledging journey (two sledges and ten men) was undertaken to the northward, between March 8th and April 27th, the first twenty-three days outwards taking the party to 77° N., the most northerly point ever reached on the east coast. Nothing but want of provisions (for they had no system of depôts) prevented a much further extension of the journey to the northward.

The opinion of the German explorers is unfavourable to the possibility of pushing much farther north along the east coast. But all depends on the season, and on vigilance in watching for and taking advantage of a lead. In 1872, Captain David Gray, of Peterhead, in the whaler 'Hope,' saw a wide extent of open water, with a water sky to the northward, on this east coast; and, in 1874, he reported a great and unusual drift of the ice in the Spitzbergen Sea.

On the whole, the East Greenland route ranks next to Smith Sound, as a promising direction to take with a view to exploring an important section of the unknown Polar area. It complies with several of the conditions of success—navigation along a coast line, possibility of finding winter quarters beyond the threshold of the unknown region, and the means of exploring by sledge parties. A depôt ship would be established at or near the Pendulum Islands, while the advanced vessel would only have to reach about the 78th parallel in order to be within the unknown area, and so to make some measure of success certain. Recent experience has taught lessons, and suggested measures which will ensure immunity from scurvy, and with a healthy crew the sledging operations over such ice as is described by the Germans, could be extended four degrees farther north at least, to the 82nd parallel. This would bring them within a short distance of Beaumont's farthest, and the discovery of Greenland would thus be completed—one of the most important geographical achievements that remains to be accomplished by this generation. The east coast is reported to be frequented by musk oxen, and its ice floes by bears and seals; so that the explorers would be able to obtain fresh provisions, while the winter darkness would be much shorter, and the climate less rigorous than that to which the late Expedition was exposed. The magnificent mountains and fiords of this east coast present features of peculiar interest in several branches of science, and the various discoveries made by explorers who will complete the circuit of Greenland will be of great value.

On the whole, then, the East Greenland route is probably the best that can be selected for a new expedition; because it offers greater facilities and better chances of success, and also because by it the important discoveries of the Expedition of 1875-76 will best be followed up and made continuous. But there are at least four routes from which to select, namely, those of Jones Sound, East Greenland, Franz Josef Land, and the North-east Passage. The reasons for continuing the work are as strong as those for commencing it, and geographers ought not to relax their efforts after one success. There should be continuity in their measures, and, through good report and evil report, they should steadily persevere until the exploration of the unknown region round the North Pole is completed.

The navy now has a new generation of able and experienced ice navigators and sledge travellers. The enthusiasm for Arctic work is as keen and fresh as of old; and our confident hope is, that picked crews from the navy of England may soon again be able to repeat the soul-stirring words of Frithiof's Saga:—

> "There's the flag on the mast, and it points to the North,
> And the North holds the land that we love;
> We will steer back to northward, the heavenly course
> Of the winds, guiding sure from above!"

THE GREENLAND FÖHN.*

One of the chief peculiarities in the climate in the Arctic regions, and especially in that of West Greenland, is the instability of the temperature in the cold part of the year. There is not only a great difference in the mean temperature of each month in different years, but sudden changes from the bitterest cold to a thaw, and *vice versâ*, often happen several times in the course of one month.

Dr. Pfaff has presented the Copenhagen Meteorological Institution with a series of observations made in Jakobshavn over a period of twenty years. From these it appears that the month of February may have a mean temperature of + 16°·3 Fahr., which was the case in 1872, but also one of ÷ 24°·9 Fahr., which it had in 1863. It will thus be seen that, in a period of eleven years, the mean temperature of the month of February differed 41° This variableness is nearly incomprehensible to us who live in the western part of Europe, for it is about as great a difference as there was in Copenhagen, in about the same period, between the coldest winter month (February 1870, 23°·5 Fahr.) and the warmest summer month (August 1868, 66°·2 Fahr.) The Jakobshavn series of observations also presents the most wonderful instances of changes of temperature from day to day. During the month of February 1866, the thermometer rose three times more than 45° Fahr. during twenty-four hours. On the 3rd February, 1871, in the morning it stood at − 13° Fahr., in the evening at 6°·8 Fahr., and the next morning at 33°·8 Fahr. On the 31st January, 1873, at 2 P.M., the temperature was ÷ 5°·8 Fahr.; but, before 11 P.M., it was 33°·8 Fahr.

These peculiar and sudden changes from cold to heat are—as far as the observations before us allow us to conclude—especially marked at Jakobshavn; but they also take place all along the western coast of Greenland, from Cape Farewell to Upernivik, and they generally happen at about the same time on the greater part of this coast. They have, of course (as the reader may suppose), given rise to a great deal of speculation, because they happen nearly *when the wind goes towards S.E. or E.* It seems very curious, indeed, that the temperature should become warmer contemporaneously with a direction of the wind which blows straight from the highlands of the interior of Greenland, which are covered with eternal snow and ice. It is not surprising to find that old authors have attempted to explain this peculiar phenomenon by surmising the existence of active volcanoes, or even that there was a comparatively mild climate in the interior of Greenland. This surmise cannot, for meteorological reasons, be maintained; for an Arctic continent must necessarily, on account of the radiation of heat in the winter time, be colder in the interior than near the coast, where the sea has a mild influence on the climate. In the excellent description of the climate in the *Northern Inspectorate of West Greenland*, published by Dr. Rink in 1857, another explanation of the peculiar warmth of the S.E. wind was hinted at. An important step was then taken towards the correct understanding of the phenomenon, which will be fully gone into in this paper.

---

* This article was read as a lecture before the Danish Geographical Society. See our number for June, p. 166.

A glance at the map will show that Greenland is surrounded by regions which, especially in the winter, have extremely different temperatures. Towards the W. and S.W., in Labrador, in the Hudson Bay territory, and in the Arctic islands north of America, so strong a cooling takes place at this season that the mean temperature of January is as low as ÷4° to ÷31° Fahr. Towards the E. and S.E. the Gulf Stream preserves, even in mid-winter, a temperature in the Atlantic of 32° to 41° Fahr., so that the air above it may generally be supposed not to be much colder than freezing-point.

As Greenland lies between such different climates, its own must necessarily at all times be dependent on the direction of the winds. All winds from the S., through W. up to N.E., must bring comparatively cold weather; but the E. and S.E. wind, heat, and especially the S.E. wind, which comes from the warmest part of the surrounding Atlantic, and also has the shortest distance to pass over the ice deserts of the interior to reach the western coast. The character of the winter in Greenland will, therefore, decidedly depend on whether the S. and S.E. winds have been prevailing or not during the season.

A good instance may be taken from the winter of 1874-75. Though the western coast of South Greenland was clogged with drift ice as far out as the eye, from considerable heights, could discover, whereas the coast at this season is usually nearly quite clear of ice, the winter was, nevertheless, comparatively very mild, because the S. and S.E. winds were very much more prevalent than they usually are.

Although there can be no doubt but that the S.E. wind, on account of the region from whence it comes, must appear as a warm wind in West Greenland, yet it must be admitted that this is no sufficient explanation of the great rise in the thermometer which is often observed when this wind blows, especially when it appears in a storm.

When in Jakobshavn, shortly before Christmas, the thermometer reads 48° Fahr., whereas the normal temperature would be 10° Fahr., then it is not possible that this great heat should be due only to the Atlantic, which lies nearest S.E. off Greenland, for it is quite improbable that the air should have so high a temperature there at this season; and even if you would suppose that it crosses Greenland during a common gale so quickly as in eight to ten hours, yet it must on its journey be more or less cooled by contact with the great bodies of ice. We may even in South Greenland, in December, observe a temperature more than 57° Fahr. during S.E. storms, and at the same time we shall not meet with this temperature on the Atlantic very much nearer than the Azores, and it is not probable that the air should have reached Greenland from thence with unchanged temperature.

There are also other qualities, besides its high temperature, which are especially characteristic of the S.E. wind in Greenland. It always comes very dry; the snow disappears in the low land, but no running streams appear. The storm first commences in the tops of the mountains from which you may observe the snow being whirled high up into the air, only gradually the wind works down into the hollows by the fiords (creeks); sometimes the S.E. wind commences with light squalls with snow or rain, but the sky then generally soon clears and downfall rarely happens, as long as this wind blows.

These circumstances lead us to consider facts that are well known in other parts of the world, and which might help in discovering the circumstances that are active in producing the high temperature in the S.E. wind in West Greenland.

It sometimes happens that *on the northern slope of the Alps* a gale-like southerly wind commences very suddenly, which rushes down with irresistible force from the snow-covered peaks into the narrow valleys that lead towards the north and agitate the great Alp-lakes terribly. This wind, which is called *Föhn* is, although it comes from the snowy region, unusually hot and very dry. Professor Dufour has shown, that during a *Föhn*, which raged on the 24th and 25th September, 1866, the thermometer stood 11-16 degrees Fahr. higher than it normally could be expected to do, and that the temperature was curiously enough higher in the city of Zug, although it lies 440 feet above the surface of the sea, than it was at the same time north and *even south* of the Alps. That the *Föhn* wind is unusually warm and dry is also proved by the circumstance that the limit of the snow is in the valleys always found to have receded considerably when the gale ceases; from this reason it is also called "the great snow-melter." Whereas the S. wind blows on the northern side of the Alps as the dry and hot *Föhn*, it appears on the southern slope as a moist *Sirocco*, which is often accompanied by an enormous downfall of snow. Some years ago Dr. Hann, in Vienna, most satisfactorily solved this mystery.

It is well known that the pressure of the air lessens upwards in the atmosphere; any body of air which is from some reason forced to rise from the surface of the earth up to a certain height, will for this reason gradually more and more be exposed to a less pressure and will in consequence expand; as, however, every expansion is a process that consumes heat, the air will consequently be cooled while it rises. So long as the cooling allows the air to contain its vapour dissolved, it will, according to calculations, proved by observations, cool 1° Fahr. every 180 feet it rises. When the dewing point is exceeded, so that the vapours begin to separate into clouds, rain or snow, then will—

on account of the transition of the moisture from an airy to a fluid or firm state, whereby the latent heat is released—the cooling process at once proceed very much slower, and it may, for the distances we deal with, be put at ½° Fahr. for every 180 feet. When, on the contrary, a body of air sinks towards the surface of the earth, it will gradually come under a greater pressure, *i.e.*, it will be compressed, and consequently be heated. Its temperature will then more and more differ from the dewing point, and the vapour will with greater and greater ease remain dissolved in airy state. The rise in temperature will consequently be during the fall 1° Fahr. per 180 feet. If we, taking this into consideration, consider what happens when a S. wind is forced to rise up the Alps, we shall find that such an air current will arrive at the southern foot of the mountains hot and nearly saturated with moisture, for it comes from the Mediterranean. During its rise it will rather quickly be cooled to its dewing point, and will, from this moment, only lose during a heavy downpour of rain, and, afterwards, of snow, ½° Fahr. every 180 feet it rises. When it goes beyond the mountain ridge the air current pours with great force through the narrow Alp passes and valleys down the northern slopes, and is heated 1° Fahr. every 100 feet, and becomes more and more comparatively dry, for it cannot contain much more moisture than corresponds with perfect saturation at the low temperature it had when passing beyond the ridge.

If we leave out of consideration the amount of cooling that takes place on its way through irradiation and contact with the great mountains, we shall, by a simple calculation, get at the following result:—*The temperature of the S. wind must be at the northern foot of the Alps about as many ½ degrees Fahr. greater than at the southern foot as the mountains' height in feet divided by* 180, for it lost ½° Fahr. every 180 feet it rose, and gained 1° Fahr. every 180 feet it fell.

In this way the curious qualities of the *Föhn*, and especially the fall of snow on the south side of the Alps, which is simultaneous with unusual heat and dryness on the north side, may be explained without difficulty, and it also proves that similar phenomena will appear in greater or lesser degree wherever a moist and comparatively hot current of air is forced to rise over an obstacle, which it finds on its way. The best proof of it may be found at the Alps, for, under favourable circumstances, a N. wind can produce similar results, only *vice versâ;* for it appears in the form of a snowstorm on the north side, as a dry and hot *Föhn* on the south side.

Föhn is now the common name *for those peculiar climatic circumstances observed in the most different parts of the earth on the leeward side of chains of mountains or highlands.*

Let us now return from the Alps to Greenland, and we shall easily be convinced that the characteristic qualities of the *Föhn* are just the same as those described as belonging to the hot S.E. wind on the west coast of Greenland, and, in so far as this wind comes from the Atlantic, S.E. off Greenland, it will be no difficult matter to prove that the conditions for the appearance of a *Föhn* wind are fully there.

According to the enquiries and measurements lately made in Greenland of the height of the coastland, it cannot be doubted that the mountains in the interior at least rise to a height of 6000 to 7000 feet. By passing this ridge a current of air would therefore, if it comes from the sea, and consequently is saturated with moisture, theoretically gain $\frac{6500}{180} = 36$ times ½° Fahr., or 18° in heat. If, therefore, the wind on the S.E. coast of Greenland only had a temperature of about 41° Fahr., it could afford to lose considerably by cooling on its journey of 400 miles over ice deserts to Jakobshavn, and even after such a loss appear with a temperature such as is often observed in the winter months of 42°, 46°, or 50° Fahr.

It may thus be said that there is a very great probability that the S.E. wind in West Greenland owes its peculiarly high temperature to two circumstances, viz., that it brings air away from the comparatively warm Atlantic, and also that this air must rise over a great height to be able to reach the west land. Of this, however, there has not previously been any proof. Neither has it been satisfactorily explained why this wind produces a very much varying temperature, although it apparently always comes from the same direction; at times it will bring the thermometer up to 50° Fahr. in the coldest part of the winter; at others it will only diminish the frost, and sometimes it has scarcely any effect.

The difficulties in tracing the *Föhns* in Greenland are very much greater than elsewhere. Although we have a sufficient number of observations to prove its appearance on the west coast, yet we have none to enable us to follow it backwards to its sources, for, as we know, the interior and south-east coast of Greenland is not inhabited by Europeans, nor are any ships about in the neighbouring parts of the Atlantic in the winter time of their own accord. In a solitary instance there are certain observations from the east coast of Greenland made by the shipwrecked crew of the 'Hansa,' belonging to the second German Polar expedition. After the ship was lost the crew drifted on an ice floe during the winter of 1869-70 and the following spring, from about 70° N. lat. southwards along the whole east coast of Greenland as far as Cape Farewell. There are, however, several unlucky circumstances that made the observations of this wonderful voyage rather useless for our purposes. *Firstly*, the barometer, which is, without comparison, the most important instrument, was lost on the wreck of the ship; *then*, the floe only reached that part of the east coast of South Greenland where it would be possible to meet with the S.E. wind before its rise, very late in spring; and, *lastly*, this spring was unusually poor in *Föhn* phenomena in West Greenland itself. The travellers found the N. and N.E. winds predominant, and especially did the most of the gales come from this direction.

Although we did not succeed in tracing the S.E. wind in the Atlantic from this source, meteorology however affords another and safe means of determining the direction of air currents in a place where there are no local observations. We have, namely, the Buys-Ballot's law, which, in its simplest form, asserts that the wind always blows in that direction, that it has a higher air pressure on its right than on its left side, and that the more unequal the pressures are, the greater is the velocity of the air. It would, therefore, be sufficient for the purpose of proving a south-easterly air current in and over Greenland *to find that the barometer stood, at a given period, higher in Iceland than* *in the Davis Straits.* The greater difference in the barometer readings would prove a stronger and more decided S.E. wind blowing between the two places. We will now apply this law in a given instance.

Towards the end of November and the beginning of the month of December 1875, there was a period of *Föhn* in West Greenland, which must, on account of its long duration, the high temperature, and the violent gales, be considered as very unusual. In perusing the observations of twenty years at Jakobshavn the author has not succeeded in finding any instance of a winter *Föhn*, that even approximately can be compared to the one observed in 1875.

In the northernmost meteorological station in West Greenland, *Upernivik*, 72° 45′ N. lat., the *Föhn* commenced on the 24th November with an easterly gale. The thermometer stood in the morning at 14° Fahr., in the evening it rose to freezing point, and the next day, towards evening, it rose to more than 51° Fahr. If we take into consideration that the normal temperature of this season is about 5° Fahr., we find a heat excess of 46°. The weather kept, with only a short interruption of light frost, from the 5th to the 8th of December, extraordinarily mild up to the 12th of December, or nearly eighteen days. The wind was mostly easterly, and especially in November very stormy.

In *Jacobshavn*, 69° N. lat., the *Föhn* commenced with a violent south-easterly gale in the night of the 23-24th November. The thermometer stood, on the 24th, in the evening, at 33° Fahr., and next morning at 46½° Fahr. As the normal temperature is about 16° Fahr., the heat excess was 30½°. The *Föhn* heat remained, with a shorter interruption of light frost on the 6th and 7th December than at Upernivik, up to the 12th December. Yet, the day before it ceased, the thermometer showed 47° Fahr. The wind was nearly uninterrupted S.E. and very stormy; on the 2nd December it was like a hurricane, with the thermometer at 50° Fahr. the whole day.

In *Godthaab*, 64° N. lat., the commencement of the *Föhn* was not so clearly marked as in the stations more to the north. On the 23rd November, the thermometer already rose, during an easterly gale, over freezing point, and next morning to 38° Fahr., but then it fell under freezing point until the *Föhn* proper began, on the 26th November, in the evening, and lasted, without interruption, until the 11th December, in the evening. During the last days of November the heat rose to 53° Fahr. The wind was, as it usually is on this station, more changeable than further north, but varied mostly between N.E. and S.E., seldom blowing a gale.

On the station, *Kornok*, far into the Godthaab fiord, the thermometer also rose, by strong E. wind, first on the 23rd November, over freezing point towards evening, but the heat remained there, although the land ice is in greater proximity, more constant, and at a higher figure than at Godthaab, up to the 12th December. The wind was predominantly S.E., and very stormy, until the 3rd December; later on, it blew mostly from E.N.E., and with less force. In the last days of November, and the first days of December, the thermometer stood at 52° to 54° Fahr.

At the entrance to the Godthaab fiord, about eight miles west of Godthaab, on the station *Kungek*, the *Föhn* likewise commenced on the evening of the 23rd November, with a strong easterly wind, and kept up pretty well until the 12th December; the temperature, however, was somewhat lower and less constant than at Godthaab, and the wind was very variable both in direction and force. On the last day of November and the first day in December, it blew a strong north-easterly gale, with the thermometer at 46° Fahr.

Finally, on the station most to the south, *Ivigtut*, 61° N. lat., which is known by its cryolite quarries, the *Föhn* commenced already on the 19th November, for the thermometer rose during a south-easterly gale to 45½° Fahr. On the 24th and 25th November, a short interruption with light frost set in, but after that time the temperature steadily kept higher than freezing point up to the 12th December. Several times the temperature rose from 50°-54° Fahr., and it even reached a maximum of 57½° Fahr. on the 8th December. The wind, all through, S.E., and very stormy; several times it blew nearly a hurricane.

We have thus found a very remarkable *period of of 18-20 days' duration*, in which the great cold of the winter in West Greenland is broken by mild weather by easterly and south-easterly gales. The thermometer rose in the southernmost part of Greenland above 57° Fahr., and stood, even as far north, as 73° N. lat., 51° Fahr. Whereas the mean temperature of West Greenland at this season normally would range between 26½° Fahr. towards the south, and 5° Fahr. in the north, we find that the days between the 23rd November up to 11th December 1875 give a mean temperature of 40° Fahr. in the south, and 32° Fahr. in the north.* There was thus a heat surplus of about 13½° in the south, and so much as 27° in the north.

We may observe that the *Föhn* prevailed about the same time along the whole of the inhabited part of the west coast, but that it commenced somewhat earlier in South Greenland than in North Greenland. The wind varied in the different localities between N.E. and S.E.; but these variations had, nevertheless, no great influence in changing its peculiar qualities, and therefore they may, probably, be due to local circumstances, such as the directions of the fiord-valleys. The force of the wind was very great, and, often, even violent. We may also observe, on account of the good position of the meteorological stations on the Godthaab fiord, that the *Föhn* appears hottest immediately after its descent from the inland ice, and has already lost no little part of its heat before it reaches the outer islands. How far into the Davis Straits and Baffins Bay the *Föhn* does reach cannot be decided; but a lucky chance showed that an English vessel lay frozen on the other side of the Straits near *Harrisons Point*, 66° N. lat., that is to say, about the same latitude as Godthaab. According to the meteorological journal of this vessel,† the mean temperature was, from the 23rd November to the 11th December, 6° Fahr., that is to say, 31° colder than at Godthaab. The wind was predominantly westerly, and it only twice veered round to the east, which caused a considerable rise in the temperature, to 24° Fahr. and 28° Fahr.

N. HOFFMEYER, Capt.
Director of the Meteorol. Inst., Copenhagen.

---

* The mean temperature was in Ivigtut 40°·3 Fahr., in Godthaab 36°·7 Fahr. (Kangek 34°, Kornok 38°·8 Fahr.), in Jakobshavn 38°·8 Fahr., and in Upernivik 35°·5 Fahr.

† This information is due to the kindness of Mr. Scott, Director of the London Meteorological Office.

NOTE ON THE DRAINAGE OF THE UPPER OXUS BASIN.

AMONG the inquiries which engage the attention of an engineer, the investigation of the flood volumes of rivers of a district is an important one. For determining the proper waterway of bridges, for drawing up projects for the water supply or drainage of towns, and for irrigating the neighbouring land—all purposes which involve a heavy expenditure of money—a lengthy series of detailed observations of various natures is indispensable. But preliminary estimates may usually be compiled in combining and comparing the information derived from local traditions or from noting actual flood marks, or from a few measurements of one river, with the results acquired from a more certain knowledge of other rivers. The process of finding a flood discharge may be executed by the aid of an empirical formula, wherein the area of the basin, the length of the river's course and a constant, adapted to the local physical conditions, enter as functions. On the other hand, having a more or less accurate knowledge of the flood volume of a river, the value that might be found for the constant in the above formula would broadly indicate the different physical conditions which attach to the drainage basin under examination.

It is in this way that physical geographers, when dealing with a little known or unexplored river, may find the above process of comparison useful. The results afforded by such a formula, though not exact, may sometimes enable them to indicate special physical conditions of a drainage basin, which would otherwise escape attention, from a difficulty or an impossibility of observing it properly. Investigations of this nature would justly be relegated to obscurity after an accurate knowledge of the locality in question had been attained. But, meanwhile, geographical interests would be served in utilising such scanty information as might be available; and in the present paper I shall therefore endeavour to compare the drainage basin of the Amû-darya with others of which we possess fuller and more accurate knowledge.

My memoir in *Journal R.G.S.* for 1875 stated the maximum discharge of the Amû-darya to have been about 144,000 cubic feet per second in the year 1874.* This quantity was the volume that passed Toyon-boyin, a point on the river above where the irrigation canals commence to be diverted (chiefly) for the fertilization of the Khanate of Khiva. For a distance of about 450 miles up the Amû-darya from Toyon-boyin the river receives no affluents, and the figures above given should, therefore, represent the flood discharge at a point situated near where the stream is crossed by the 67th parallel of E. longitude. The area of the drainage basin, above the second locality specified, is about 85,000 square miles, and the question presented for consideration is, whether this volume of 144,000 cubic feet per second fairly represents the maximum drainage that might be expected to flow, in any ordinary year, from a district possessed of the physical character of the country traversed by the Upper Oxus?

An ordinary maximum flood discharge of the Amû-darya amounts (as it appears) to about 1¾ cubic feet per second per square mile of the country drained; and if this be compared with the flow from European Alpine districts (many of whose physical characteristics cannot be very dissimilar to those of the great central Asiatic highlands), we shall immediately be struck with a remarkable discrepancy. In the Arve (for example) a stream that drains 772 square miles of the most precipitous and snow-bound district of Europe, an ordinary maximum flood would amount to 10 or 11 cubic feet per second per square mile. The Rhone, whose valley above the Lake of Geneva has an area of 2307 square miles, discharges in an ordinary flood about 11¼ cubic feet per second per square mile at Porte du Sex. The basin of the Upper Ticino, embracing an area of 2518 square miles, has an ordinary maximum flood discharge of 11¾ cubic feet per second for every square mile of country drained, down to Sesto Calende. In the last case it might have been supposed that Lake Maggiore (which covers rather more than 80 square miles) would have been found more efficient in moderating the drainage flowing into it; for on this head it is to be noted that the flood volume of 11¼ cubic feet per second per square mile, which enters the Lake of Geneva, is reduced to a maximum discharge of 5 cubic feet per second per square mile, flowing out of the lake. Lake Leman is, however, nearly thrice the size of Maggiore. The greater drainage from the basin of the Upper Ticino is doubtless due to the rainfall, amounting to a yearly average of 66 inches, as compared with one of 34 inches that takes place in the Upper Rhone Valley, and this circumstance suggests whether the discrepancy that has been indicated in the volume of drainage flowing from the Upper Oxus basin can in this way be accounted for.

Even, however, if we allowed as much as 5 cubic feet per second per square mile out of the volumes draining from the Arve, Upper Rhone, and Upper Ticino basins as due to rainfall, we should still find the discharges of these three Alpine rivers of Europe to be nearly four times larger than the quantity of water carried down from the plateau of Central Asia by the Oxus. Nor is it, indeed, certain that the latter river may not be swelled by precipitation—in addition to melted snow from Pamir—from the slopes of the Hindû Khûsh, &c. Though the Upper Oxus Valley is on the verge of the great rainless Asiatic track, our knowledge of the climate is as yet very limited. Wood, during his journey to and from Lake Victoria, mentions having experienced heavy rain in Badakhshân in December; while he also describes precipitation in considerable quantities to have taken place on eight or ten days in the following March. We can, therefore, be by no means sure that rain does not fall in the Valley of the Upper Oxus during the summer, and that the drainage of 1¾ cubic feet per second per square mile, is entirely due to melted snow and ice. But, even should it be assumed that no precipitation occurs during the epoch of the Oxus floods, we know, on the other hand, that local physical conditions exist, which should intensify the action of those floods; for a great part of the slopes of the drainage basin must be extremely steep, while no forests exist which might regulate or check the descent of melted snow-water flowing down those slopes. Neither along the upper courses of the

---

* Burnes calculated the Oxus flood in 1837 to have been about 150,000 cubic feet per second.

Amû-darya do any lakes occur whose presence might act as moderators of the flood stream that rushes down towards Lake Aral. All such considerations tend to show that, judging from the Alpine rivers of Europe, the ordinary flood discharge of the Amû-darya should apparently be nearly four times greater than the quantity that has been measured.

On the other hand it must be remembered that the Alpine basins which have been referred to possess an area of about 1-30th only of that of the Upper Oxus, and that the greater length of the course of this river must therefore in itself act as a moderator of floods. Still, the whole portion of the Amû under consideration receives an enormous number of affluents from the high snow-bound mountains which border Pamir, Afghânistân, and the southern limit of the Zarafshân Valley. Even in December, according to the notes registered by Wood, one of the affluents alone (the Khânabâd River) must have been carrying 5000 cubic feet per second. At Jânkila, on the Oxus, above the confluence of the Kokcha, the river must have gauged in March — according to the same authority—something more than 20,000 cubic feet per second; while below the point named it had still to receive five large tributaries before carrying its full stream.

If, now, we turn to the Danube at Pesth, where the drainage basin of this river is little smaller than that part of the Oxus basin we are speaking of, the ordinary flood discharge per second per square mile will be found to be 6 cubic feet; and deducting one-half of this for rainfall, and attributing the other half to melted snow-water from the northern slopes of the Alps, we shall still find the Oxus flood discharge to be about a half of what one might expect it to be. Bearing in mind, therefore, that the figures given for the Amû-darya may be accepted as an approximation to the truth, some explanation of the apparent smallness of this flood discharge becomes necessary.

Although we know the character of the soil of the Upper Oxus Valleys to be decidedly cretaceous, it would, perhaps, be going too far to assign to such conditions any paramount moderating effect on the floods of the river. However, as a fact, such is actually the case in the Thames basin, where the waterway of bridges crossing streams which drain areas of chalk, plainly show the relief that is afforded to flood waters by the geological structure of the locality. But, whether such a cause may operate or not in the case of the Amû-darya, I am inclined to suggest another, though somewhat similar, explanation of the difficulty; and one, moreover, which, from the ancient history of the Oxus, may at the same time be regarded as being almost special to this river. If the theory I have elsewhere broached be a just one, and if the whole of the great sandy desert that stretches from the Caspian eastwards was formerly cultivated by the aid of irrigation canals, derived from the ancient Oxus, which flowed westwards from some point above Charjui to Balkhân Bay, it is highly probable that a considerable proportion of the flood of the Amû-darya must now find its way into the old course, and into obliterated irrigation canals, and be thus lost to the stream, that passes to Toyon-boyin at the present time. Although this desert is as yet very little known, still many routes lead across it in different directions, and wells of good water exist along those routes. On the surface of this desert, which has been crossed by Taylor Thompson, by Abbott, and by Richmond Shakespear, there is abundance of shrub, jungle, and other vegetation; while sweet water is found under the sands which now hide the old Oguz bed of the Oxus.* Thousands of Turkomans must nomadise in this desert, with large herds of camels, and must be able to procure water for their sustenance in spring, at least when the flood season of the Amû-darya commences.

To show that this explanation of the small flood volume passing Toyon-boyin is not entirely unworthy of consideration, I shall quote a passage from a paper by Colonel P. P. L. O'Connell, Royal Engineers, which is printed in *Proceedings of the Institution of Civil Engineers*. The passage is as follows:—

"The beds of most rivers of Southern India are dry for many months in the year. Some of these beds appear to be connected with extensive strata of sand near the sea, so that the first floods of the wet season are very much moderated, and in some instances lost before reaching the sea. The Pennair, a river entering the sea near the town of Cuddalore, has a total length of 250 miles. It drains about 6000 square miles of country. The water was 3 feet deep in this river at Mannaloorpett on 16th May, and again 6 feet deep on 4th June 1855 at Riandavaram, while at Cuddalore there was no sign of a fresh, the whole having been absorbed in the 60 miles of river bed lying between the two last places named."

Thus, there is scarcely any doubt that, like many Indian rivers, but in an enormously greater degree, the Amû-darya contributes some large portion of its flood waters to the sand drifts, which now fill up the ancient course of the Oxus and the buried irrigation canals, which cross the wide expanse of desert that stretches from the left bank of the Amû-darya down to the eastern shores of the Caspian. In this way, the apparent smallness of the present flood volume of the river is reasonably accounted for; until such a time, at least, as it shall have been measured at the locality where the Amû ceases to receive any water from tributaries, or until fairly reliable observations of the rainfall characterising the Upper Oxus Valleys shall have been recorded.

Herbert Wood.

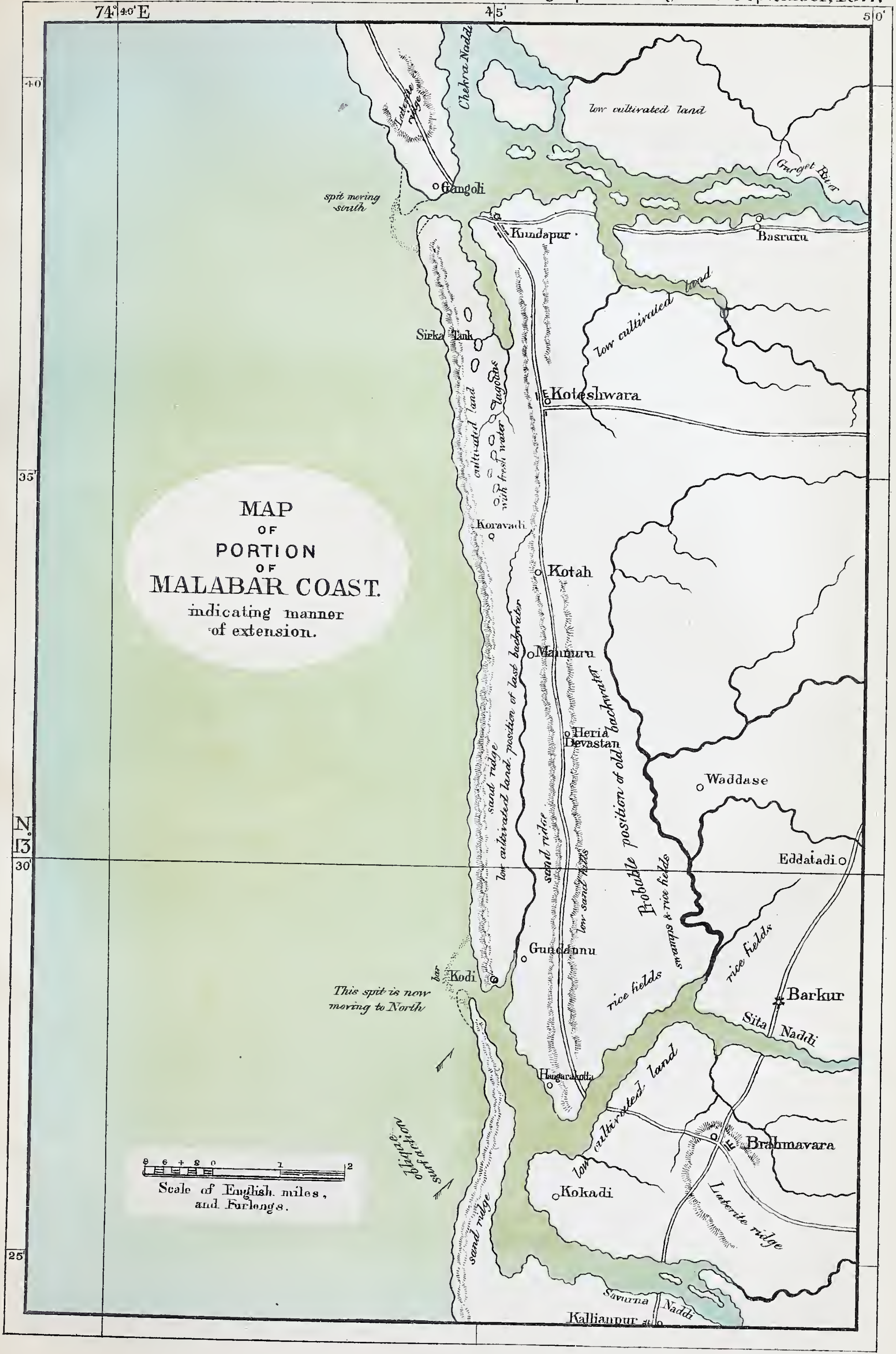
EXTENSION OF THE MALABAR COAST.

If any large map of India, such as Mackenzie and Conner's, is consulted, it will be seen that the estuaries of the rivers of the Malabar Coast are of a peculiar shape. Before the rivers mingle with the ocean, they form broad and extended sheets of water, separated from the sea by narrow strips of land, and comparatively small openings through these strips give exit to the waters.

Popularly known by the name of "backwaters," these inlets form a chain, which, by the addition of a few more links, would secure inland water communication from Canara to Travancore, some 350 miles in length. The sections of the canal required to bring about this desirable end have been "under consideration" for many, many years. How desirable, we—

---

* *Vide Proceedings R.G.S.*, Volume xx., "Napier's Journey on the Turkoman Frontier of Persia."



T. Pettitt & Co. London.

who sojourn in a land cut off for months from the rest of the world by swollen rivers and a boisterous sea, whose solitudes are seldom invaded by vessels from June to September—know best.

Many of the backwaters form excellent harbours, such as those of Cochin and Mangalore; but they are one and all marred by dangerous bars at their entrances. In nearly every case, too, the mouths are of a shifting character, generally—so far as my observations go—moving from south to north.

I propose, in this paper, to show briefly the forces that are at work in the formation of backwaters; and that the final result of their action is the gradual extension of the west coast of India. I must premise that, though I have travelled occasionally on the backwaters as far south as Cochin, I am not intimately acquainted with other than those of South Canara, which I have had under observation frequently since 1870. Illustrations are, therefore, taken from this district.

Glance again at the map, and mark the Western Ghats, with the low country, drained by innumerable streams, betwixt their heights and the Arabian Sea. The Ghats rise two to three thousand feet, with peaks of six, seven, and eight thousand feet, whilst the plains cannot exceed an average of more than a very few hundred feet. Against the hill-barrier falls the full force of the moisture-laden south-west monsoon, and leaves 200 to 300 inches of rain there, whilst 120 to 140 inches fall on the plains. Taking 140″ as a mean, in round numbers, 9,000,000 tons of water annually fall on every square mile of the Malabar Coast. It is not wonderful, then, that under the enormous energy exerted by this mass, denudation proceeds rapidly, and that flooded rivers bear seawards large accumulations of silt and sand.

Swept out to sea, were there no other forces in operation, the sand would be deposited where the river currents lost their bearing power, and each grain would add its mite to the ocean bed. There is no such repose in store for the sand grain. Rolled in by the pendulum swing of the surf, stirred up by the breakers that constantly beat on the coast, it is impelled shorewards until left high and dry by the retreat of the wave that has swept it on to the ridge of sand that forms the arm between sea and backwater. No rest yet. The blustering sea-breeze of the dry season, the stronger blasts of the south-west monsoon, urge it ever eastwards, till, buried in the stillness of the backwater, it finds at last a quiet grave.

The same surf that heaps the sand along the coast takes advantage of every inlet to carry its burden inwards. The sand-bearing power of a river, flowing at from 4 to 5 miles per hour (about the mean velocity at the mouth of a large west-coast river in flood), cannot for a moment compare with that of even a small wave breaking obliquely on the shore. Stirred up by the wave, flocculent clouds of sand may be seen carried along in suspension by the swirl, and deposited in defiance of the outward-flowing river current. This inward sand-bearing action of the surf is necessarily confined to the shores of the mouth. In the channel the stream rolls along the sand at the bottom, and thus scours for itself a sufficient waterway. If the current sets on either bank, that bank is undermined, and the sand, settling into the deep channel, is rolled outwards. On the opposite side, where the weakened current has ceased to act on the bed, wave deposits gradually push on the sand spit. Thus it is that the mouths of rivers and backwaters shift their positions. That the majority move northwards, I attribute to the fact that during the dry season, when the most marked surf deposits occur, there is generally, more or less, a south-west swell, whose oblique action causes sand to travel up the coast,* and overpower opposing river currents.

Pondering on these influences at work on backwaters, I was irresistibly led to the conclusion that the balance of power lay with the winds and waves; that rivers, aided by the waves, might bring forth backwaters, but that from their birth the last were doomed. Moreover, rivers would bring more silt into backwaters than, enfeebled by its passage through them, the current could possibly expel. Add to this the ceaseless drift of sand returned from the sea. I pictured to myself the last days of a backwater choked with sand;—how floods, each succeeding year, would be forced higher and higher, until their waters burst the confining belt of sand, and found their way straight to the sea;—the crescent-shaped bar that would then be formed, whose southern cusp would gradually emerge from the sea, and, strengthened by the gatherings of the waves, would become the protecting arm of a new backwater;—how the old backwater, now a silt trap, and still exposed to the wind-borne sand, would shallow, until at last the waters crept away, and the plough, in lieu of the keel, furrowed its surface.

If these views were, in the main, true, I argued there would be no lack of evidence, and I have been amply rewarded even by the cursory examination of the coast I have found time to make. In many cases the unmistakable sand-ridge parallel with the coast, marking the old shore line, is to be found on the inland side of broad belts of level, cultivated land, raised but slightly above the ordinary flood line of contiguous rivers. In some cases the sequence of sand-ridge and level occurs twice or thrice, whilst in one case converging rivers seem to be commencing the formation of the third backwater of their series. The first of these is completely dry, saving its drainage stream; the second, more recently deserted by the rivers, has still 2 miles of its length covered with water at high tides, and ponds scattered along the remaining portion, which is under cultivation.

On the accompanying map of this portion of the coast, enlarged from Mackenzie and Conner's survey,† I have roughly indicated the positions of the old backwaters and their bounding sand-ridges. The two systems of rivers flowing out near Kodĭ and Găngōlĭ are gradually approaching each other, and will probably meet centuries hence, as they have met twice at least in bygone years. How many centuries since they last parted? It is hard to say. The Sirkar tank still contains the descendants of the choice sea-fish (now habituated to fresh water) that Tippu nourished therein for his table; but the arm of backwater leading to the spot, then deep enough to float large native craft, is now, at ebb tide, an extensive flat, whose mud is the delight of the wily curlew.

---

* In confirmation of my observations on this point, I have the experience of Major R. B. Branfill, of the G. T. Survey of India, whilst engaged in tidal operations at Mangalore in 1872.

† Sheets 42 and 43.

Now notice the stream that in the accompanying map rises between Kŏrăvādĭ and Kōtăh. The wavy blue line by which cartographers denote rivers may stand for a stream rapid as a Highland burn, or dull as a ditch in Holland; so it is necessary for me to explain that the stream to which I have called your attention is only a *stream* during the rains. At other seasons it is a sluggish tidal channel, navigable for small boats to near Kōtăh. The rise of the watershed north of Kŏrăvādĭ is imperceptible to the eye. Similarly, the larger stream on the east of the road, flowing into the Sītă Năddī from the north, is tidal where parallel to the coast-line, if not further.*

Streams running north and south as they approach the sea are numerous all along the coast, and, so far as my experience goes, they are all similar in character to those quoted above. Is it not admissible to argue their similar origin? I have, on my own part, little doubt that one and all flow along the lines of ancient backwaters, and that the coast, where this peculiarity of the rivers exists, has been built up in the manner described. It is but a narrow strip of land, after all, that has been gleaned from the surf; but the work has been short in the language of geographical change, and it is still in active progress. It is interesting to note, moreover; for, clearly, it was not the process by which the inland portion of the districts of Malabar and Canara were raised from the deep, with their strange table-like laterite hills frowning down on their smiling valleys. Who shall tell what truth there is hidden in the legend of the Indian god, whose fateful arrow, fired from the Western Ghats into the sea that then rolled against their cliffs, brought this land of beauty, another Venus, from the waves?

E. W. Pringle.

Note.—The average advance northwards of the Netravati River at Mangalore is 250′ per annum. The entrance to the harbour is now at its north end, and the two rivers, Netravati and Gurpur, flow out of the one mouth, and not as shown in Mackenzie and Conner's Map.

ON THE VEGETABLE FOUNTAINS OF THE TROPICAL AMERICAN WILDERNESS.

The water-supplying plants of the tropical forests are often of the very greatest value to those whose steps are led, from any cause, far from the streams or known springs, and yet they are scarcely heard of beyond the districts in which they are known. To the "Ciringéro" Indian (the india-rubber collector), or of mixed blood, who often has to leave the rivers far away behind him in the search for new and more prolific india-rubber tracks, they are invaluable. He may have to cut his *picada* for days through the dark pathless woods, having to rely entirely on these vegetable fountains, one or other sort rarely failing those who know how to find them. At times, however, the sarsaparilla digger, hunter, or "Ciringéro," is reduced to drinking from the dark rain-water which has been caught in the hollow trees, and which swarms with the larvæ of midges and mosquitoes. The entire trunk of many of the forest trees is made up of chinks and crannies, especially those of the Carapanaidba nacaritiba trees. A man, however, who, of course, never goes into the forest without his long machette knife, need rarely have recourse to these. If he knows the forest, he will nearly always be able to find the large water-filled bush rope, hanging suspended from tree to tree, and falling in heavy coils to the ground; or, failing these, some of the hollow-stemmed "Imbaiiba" or trumpet trees, from the roots of which he can get a plentiful supply. Some of the natives are, however, actually so unaccountably lazy that they will rather allay their thirst with a few drops from some fœtid pool in the hollow of some rotten tree, than take the little trouble necessary to draw pure water from the vegetable fountains.

When out in the woods, I have been frequently struck with the immense distance, both in time and place, that the Indian hunters can traverse without drinking or appearing to suffer from thirst.

Of the several kinds, the most valuable to natives, who may have to remain for weeks or months in the interior of the forest, is that known as the Nambé. It takes its birth from the seed deposited in the fork of some forest tree by bird, rat, or one of the tiny squirrels which abound in these forests. Having secured foothold in some chink or crevice in the bark, and being fostered by the humid drippings of the surrounding foliage, it sends down long tendrils which descend as straight as plumb-lines until they take root in the earth far away below their lofty *perch;* there, having taken root, the plant aloft grows with increasing vigour, sending down successively stouter and stouter lines to suck up moisture from the damp ground far below, as it continues to increase in size and growth.

This living cordage is so strong that it is impossible to break or wrench it away from the parent plant seated high above in the branches of the tree. The natives, who value it greatly for making their immensely strong baskets, in which they carry all their produce from their provision grounds, or from the forest to their houses, are compelled to climb into the branches in order to cut it off above when they require it for this purpose. The "Ciringéros," or india-rubber collectors, in the interior of the forest, however, rely on it mainly for their supply of water. Having selected a large matured plant seated in some tree conveniently near their "Barraca," or house in the woods, they proceed to cut the lines some three or four feet from the ground. They then gather as many of the ends of the vines together as may be sufficiently near to each other, and, bending the ends over, tie them together with the freshly-cut points towards the ground, somewhat in the manner of a funnel. Under this they place a gourd, or one of their large earthenware pans, in order to catch the water, which soon begins to drip, and will drip on the year through, the only care required being occasionally to clear away a jelly-like substance which accumulates on the cut points of the vines.

In this manner, the "Ciringéro" and his family are as much blessed with pure cold water as though they had a spring close at hand.

This water is also excellent for bathing, whereas that supplied by the "Morotilica" bush rope, should it come in contact with the skin, causes violent itching.

---

* The mean rise and fall of tide on this coast is about 4′.

This treatment does not kill the plant above, which continues to send down fresh tendrils to replace those which have been cut away. Without this vegetable fountain, the "Ciringéros" would never be able to live in the heart of these great forests, far away from the streams, where they continue to tap their india-rubber trees month after month.

The "Morotilica" bush rope, or vine, although of less importance to the "Ciringéro," who is compelled to build his "Barraca," and to remain for long periods in the heart of the forest, is of more value to the hunter or the passing traveller.

In the Nambé, the water is slowly drawn up out of the ground, and must consequently be allowed to accumulate in the vessels placed to receive it. By it the dweller in the forest is provided with a never-failing daily supply, which is just what he wants. With the "Morotilica," it is different; once cut, there is an end of it, although the immediate supply is larger. This vine should be cut through (simultaneously if possible) as far up and as near the ground as possible. When it falls prone on the ground, like some immense cable of rope, it should be cut into convenient lengths of some three feet or so. So long as these pieces are carried carefully in a horizontal position, the water will remain in them, but as soon as they are tilted over the vessel in which the water is to be received, it runs out in one stream.

The same care must be taken of the several pieces until a sufficient supply is secured; or, should the object be merely a draught, the piece may be tilted up over the head, and the stream allowed to flow into the mouth. To save a considerable amount of water, the chief care must be to sever the vine above and below simultaneously. If it be cut through first below, the water flies up into the upper branchings of the vine, which are cast abroad in festoons among the branches of the neighbouring trees. On the other hand, if it be cut through first above, the water as quickly descends, and is lost in the roots below ground. The water is, of course, yielded in proportion to the size of the vine; but a large sound vine, the thickness of a man's thigh, will yield a large quantity of water. The water is rather turbid in appearance, and has a slightly aromatic taste, which makes it an agreeable drink to the initiated in the form of "Clibe" (or incuta, as they used to call it on the Orinoco), mixed with the "farina," or mandioca meal. I have already said this water is not fit for bathing purposes.

In Central America, in the country of the Waolwa Indians, I met with a similar vine or bush rope.*

Another source of water-supply is to be found in a species of "Imbauba," or trumpet tree. The hollow stem of this tree does not grow very large, and shoots up at intervals among the harder and larger forest trees. The roots of this tree do not grow deeply in the ground, but are spread abroad, above, or near the surface, so as to be easily cut up into lengths, and in them the water is contained, much in the manner of the bush rope.

H. A. Wickham.

THE FRENCH CADASTRAL SYSTEM.

The French cadastral system consists of three series of operations. The first is exclusively a scientific process executed by geodesists. The boundaries of the *commune* are first marked out, this being then divided into sections, and the entire commune then triangulated. A survey by means of chaining and plane-tabling is then made of each *parcelle* (holding), that is to say, of every parcel or tract of land distinct from those adjoining, either by reason of a different proprietaryship or by reason of a different culture which may there prevail. When the survey of the entire *commune* has been thus completed, it is tested, and the chief surveyor causes a copy to be made, which is deposited in the Mayor's secretariat, the original being left with the executive.

Second process. As soon as the configuration and area of every holding in the commune have been determined, the next step is to estimate the net revenue of each. This series of operations is termed collectively *expertise*, and it comprises the classification of lands, their valuation, and the fixing of each individual share. The first two operations are entrusted to the members of the Municipal Council, to whom is added by law a certain number of proprietors chosen from among the most highly taxed of that category. The classification consists in determining into how many classes, according to the different degrees of fertility of the soil, every holding is to be divided. The number of classes is restricted to five in the case of the classification of soils; in the case of house property in rural communes ten classes are permissible, while in towns, boroughs, and thickly-populated communes, every house is valued separately; the division into classes is also not applied in the case of workshops and manufactories. When this classification has been arranged by the Municipal Council, the next step is to draw up a valuation tariff, and to classify the different holdings accordingly. This operation is carried out by the proprietors who are charged with the duties of classification, assisted by the controller of direct contributions. The last step, which consists in the fixing of each individual share is taken by the last-named official. He draws up statements or tables, which form the basis of the proprietary rights and of the cadastral roll. The latter contains the amount of the funded contribution which the commune has to pay, the sum of its cadastral revenue, and the proportion in which every holder contributes. The *matrix* of the rolls, which is called thus because the rolls are merely a copy thereof, enumerates collectively, under the name of every proprietor, all the parcels of land which he may own in different parts of the commune, and thus furnishes information respecting individual tenures. It only remains, therefore, to assign each individual share proportionately, according to the valuations as shown in the matrix, a task which is discharged by the administration, and is termed *expedition des rôles*.

When the roll is completed it is submitted to the prefect, who makes it legal by a decree passed in the council of the prefecture. The proprietors have the right of assisting in the process of determining individual shares, and six months' grace is allowed to them to appeal in against the classification of their holdings.

---

* *Rough Notes of a Journey Through the Wilderness*, reviewed in the *Ocean Highways* for November 1872, p. 243.

All these records, however, would eventually become obsolete and inaccurate were not changes in the ownerships of plots, changes in the class of cultivation, and other modifications, duly registered, and the contributions proportionately modified. With this object the controllers repair to the communes every year, the commissioners, charged with the duty of fixing individual shares, being present as well. All contributors are also convened so as to indicate what changes have to be registered, always supposing that these are caused by events subsequent to the determination of the classing, and uncontrolled by the will of the holder. In case of changes which modify the revenue derivable from the property, the Mayor and five of the commissioners have to certify thereto. The changes are thus annually registered, and the contributions, as shown in the matrix, adjusted proportionately, the rolls being made legal each year and forwarded to each proprietor, by order of the Prefect, a process which is termed *emission des rôles*.

Reviews.

:o:

DANISH GREENLAND.*

Dr. Rink's work comes as a welcome contribution to geographical literature. On no country in the world had we less complete or recent information than on Greenland. Crantz, Egede, and the other old writers were all out of date, while Dr. Hayes' *Land of Desolation* was a mere tourist's work, in no way complete, and in many cases very inaccurate. Detached papers on the natural history and geography we possessed, but no systematic work such as Dr. Rink's *Grönland Geographisk og Statistisk beskrevet.*

This treatise was, however, a dead letter to the majority of Englishmen—and, indeed, to all except the Danes, in whose language it was written. Moreover, it was also getting a little old. Now, at last, not only have we in English the best work in any language on Greenland, written by the only man capable of performing the task, but also one of the best geographical monographs, within the same space, extant.

Danish Greenland, though a new edition of *Grönland Geographisk og Statistisk beskrevet* is in reality a new work, re-written *ab initio*: the information entirely reworked up and condensed in a manner which leaves nothing to be desired. The condensation of the material is remarkable. Here, within the compass of 468 pages, we have the summary of the labours of a lifetime. For twenty-eight years the author has been intimately connected with the affairs of Greenland, and for sixteen winters and twenty-two summers he resided in the country as a Naturalist, travelling around the coasts, and as Royal Inspector or Governor of the southern portion of the country. He is now living in Copenhagen as President of the Royal Board of Greenland, which has direction of the whole affairs of the Arctic Colonies of Denmark. It would have been thus impossible for any one else to have written this monograph. No man living has had the same experience, and even had there been an author capable of the task, Dr. Rink's official position in Copenhagen affords him peculiar opportunities of access to documents necessary for producing a work of this nature. Though, owing apparently to the author's conscientiousness about writing one line more than what he is certain about, the book has been called *Danish Greenland*, yet, in reality, it is to all intents and purposes a complete monograph on the land of Red Erik.

As the book is itself a synopsis, we shall not attempt any analysis of it, beyond saying that in the First Chapter we have the ancient and modern history of Greenland worked out anew. Chapter II. treats of the configuration and general physical features of the country, the interior and inland ice, the floating icebergs, which Dr. Rink was the first to discover the real nature of, and the way they are detached from the glaciers, &c. In Chapter III. we have an account of the climate; in Chapter IV., a description of the general features of the surface ice, the watercourses, lakes, and sea; in Chapter V., the products and resources of the land; in Chapter VI., the capture of seals and whales; in Chapter VII., the fishes and fisheries; in Chapter VIII., historical remarks on the Greenlanders; in Chapter IX., the inhabitants, their means of subsistence; in Chapter X., the domestic life and habits of the people; in Chapter XI., their knowledge and enlightenment; and in Chapter XII., their customs and laws, with some statistics of the population. Chapter XIII. is occupied with some curious sketches of the Greenlanders, written by themselves in the Eskimo language, and translated by Dr. Rink for this work. In Chapter XIV., we have an explanation of a series of drawings by Greenlanders, which form the illustrations to this volume. Their drawings are extremely interesting. They were the unaided work of Greenlanders, and are here inserted in facsimile. As works of art they are far from contemptible, and as accurate illustrations of Greenland life, and the mental development of the Eskimo, they are inestimable. In Chapter XV., the trade, European public institutions, and European life in Greenland are sketched; and in Chapter XVI., the topography of the trade stations and their appertaining districts is given in sufficiently full detail. Then follows an Appendix on the glaciers, and the origin of the floating icebergs; on the meteorology, geology, and mineralogy; vocabulary of Eskimo names and words, antiquarian notes, miscellaneous notes, and a synopsis of the flora and fauna, which will render the work an indispensable one to all naturalists studying the northern plants and animals. There is also a map of Greenland, compiled from original materials, and containing all that is known of the country up to the present date.

The book, though written in condensed language, is nevertheless interesting reading. The sketches of Danish and Eskimo life in the country are well told, and, from the author's position, are to be received as strictly accurate in every particular; while the account of the topography and resources of the country, though containing an immense amount of information, related in the most unaffected manner, is never wearisome or prolix. Every chapter testifies to the care with which it has been prepared, and, from the fulness of the author's knowledge, it is evident that any one chapter, in the hands of a writer less encyclopædiac in his information, could have been easily enlarged into a volume. We have rarely seen a work in regard to which we could pronounce a more entirely satisfactory opinion. To criticise its statements would be almost impertinence. When Dr. Rink comes forward to inform the world about Greenland, it can only listen. In this field he has no rival, and it is not likely that the standard work in which he has now paid English readers the compliment of narrating the experiences of his laborious and stirring life, since the days he returned from his voyage round the world in the 'Galatea,' will be forestalled by a more authoritative treatise.

---

* *Danish Greenland: its People and its Products.* By Dr. Henry Rink, Knight of the Order of Danneborg, Director of Royal Greenland Board of Trade, formerly Inspector of South Greenland, Author of "Tales and Traditions of the Eskimo," &c. Edited by Dr. Robert Brown, F.L.S., F.R.G.S., author of "The Races of Mankind," &c. With Illustrations by the Eskimo, and a map. (London; H. S. King and Co., 1877).

We cannot close this brief notice of a small book, but a great work, without saying how gratifying it is to find a man, whose right to speak authoritatively none will dispute, paying so warm a tribute to the labours of the Arctic Expedition in the exploration of the north end of Greenland. Dr. Rink considers that Beaumont's sledge party has, in all probability, finally determined the outlines of the country—a view in which most of those capable of giving a weighty opinion will, we believe, coincide.

TURKEY AND MONTENEGRO.*

Want of space compels us to review these three books together, the two first of which, at least, are entitled to separate notices. In these two works we have put before us the most opposite pictures of European Turkey; which is the most correct we must leave the reader to judge for himself, only reminding him that there is generally something to be said on both sides of a question, and recommending both these books as well worth reading, and each as a useful corrective of the other.

Lieutenant-Colonel Baker, who was already acquainted with Constantinople during the Crimean War, returned there in 1874 and set out on a tour through Bulgaria, both north and south of the Balkans, to inspect some landed estates said to be for sale, and which offered favourable investments for capital; one of these, situated about eight miles from Salonica, he bought, and has since farmed, and off and on resided on it. In his preface he tells us that it seems a duty which a traveller owes to the public to reflect to the best of his ability his experience of the countries and peoples he has visited. This duty he fulfils, and the public have gained a book full of valuable information, and graphic and amusing in a high degree. The author, besides being, as a resident landowner, well qualified to write about Turkey, had unusual opportunities of acquiring information respecting the laws and customs of the country and the habits of the people, both dominant and subject.

The Colonel set out with the disposition to be pleased and to make the best of what he found. Throughout the whole of his travels he always met with the greatest kindness, civility, and hospitality wherever he went from both Muhammadans and Christians; only once had he to produce that grand document the "booyutoo," a superior kind of passport which, on Turkish soil, acts as an "open sesame." His only enemies were the insects which swarm in almost every dwelling, and feed on Turk and Christian alike. Two instances of Turkish hospitality are very charming. At Klissura—

> "Which has since suffered so severely from the massacre, I arrived at the khan, which was served by a crabbed old woman. Had she coffee? No. Fowls? No. Eggs? No. Water? Yes. What else? Bread. So I sat down in the verandah of the courtyard, to make my dinner off dry bread, and tried to imagine it luxury. I was hungry, and had eaten about two loaves, and was beginning to feel as though I was stuffed with cotton-wool, when my ever-truthful nose detected a sweet-smelling savour, as of a stew, and, looking up, I saw a highly-respectable Turk advancing with a steaming dish in each hand. This was no less than the Mudir, or Turkish magistrate of the district, who had heard of my vacuity, and had kindly and courteously hastened to the rescue with two capital meat stews. Oh, that I could perform one of those conjuring tricks I had once seen, and bring those dry loaves out of my mouth in the form they went in! But it was not to be done; and, as the young American lady said, 'I guess if I take any more I shall have to hang it on the outside!' So I could only pick delicately at the savoury dishes, and regret the past."

A little later, near Tirnova, Colonel Baker heard that a Turkish Bey had an estate for sale. This Bey, however, had no such intention; but, instead of taking offence, he invited the Colonel and his companion, Mr. Vice-Consul Brophy, to dine and sleep. The Colonel had thus the good fortune to see the interior of the house, and the way of living of a Turkish landlord.

> "The house was a large and straggling building, with a great kitchen and a sort of waiting-hall, where, as in feudal times, good fare seemed to be provided for all who came to claim it. The numerous rooms had no pretensions to luxury. The walls and long rambling passages were whitewashed, and, as usual in Turkish houses, the only furniture consisted in handsome carpets and cushioned divans."

The Bey was absent when they arrived, settling a dispute which had arisen between two Bulgarian Rayahs, who had appealed to him to act as arbiter; and before dinner he held a sort of court or levée of his tenants, who came to him for advice or assistance. There was evidently the most perfect confidence and good feeling between the Bey and his people, whether Christians or Muhammadans, and, from certain points of the conversation, it clearly appeared that the former looked up to him for protection from the exactions of their priest. This is probably an exceptional case, and our author says there are very few resident landlords in Turkey; but it exists, or did exist, before this fair country was desolated by the savage war now raging.

Colonel Baker is a strong anti-Russian, and to Russian intrigues attributes the massacres of last year,

---

* *Turkey in Europe.* By James Baker, M.A., Lieutenant-Colonel Auxiliary Forces, formerly 8th Hussars. Third edition. Cassell, Petter, & Galpin. London, Paris, and New York. 1877.

Travels in the Slavonic Provinces of Turkey in Europe. By G. Muir Mackenzie and A. P. Irby. With a Preface by the Right Hon. W. E. Gladstone, M.P. In two volumes. Second edition, revised. (London: Daldy, Isbister and Co., 56, Ludgate Hill, 1877).

Montenegro, its People and their History. by the Rev. W. Denton, M.A., Author of "Servia and the Servians," "The Christians of Turkey," &c. (London: Daldy, Isbister and Co., 56, Ludgate Hill, 1877).

He travelled through the whole of the country, which was the scene of those horrors. He never saw a country which looked less the seat of rebellion. The people were prosperous, peaceful, and contented, and their whole thoughts were concentrated upon education and progress. He was then informed that foreign agents were still at work, but without the slightest hope of success. The Bulgarians were, till recent events, loyal to the Government and contented, and if let alone were able and anxious to be industrious and to advance in progress. He drolly remarks that the two great "isms" are the ruin of the population of Turkey and her tributaries. If the people are let alone they are able and anxious to advance in progress, but they are not allowed to do so. The Pan-Hellenic and the Pan-Slavonic parties are each dragging at the Bulgarians and producing a constant state of agitation, a feverish excitement, and want of confidence, which is a bar to all progress. He thinks that there is no necessary antagonism between the Bulgarians and their rulers, they are of the same race, and, if let alone, would live peaceably together. Difference of religion is no bar to this, the toleration, contemptuous, indeed; but still toleration of the Turk is admitted, and the oppression the Bulgarians have suffered, on religious grounds, from the Porte, has been owing to the Turkish Government being the tool of the ambition and intolerance of the Greek Church. The national Church of the Bulgarians was restored by the Sultan in 1870. We call the reader's attention to the evangelical circular of the Bulgarian Synod, at p. 52.

The schools in Bulgaria are—must we say were?—numerous and excellent, nor does Colonel Baker think the Turkish Government in any way hostile to education. The gymnasium at Philippopoli derives its funds from a direct tax or compulsory school-rate levied by the Ottoman authorities under a special firman. He adds that the Ottoman authorities frequently attend, by invitation, the public examinations and delivery of prizes at the Bulgarian schools.

The Colonel gives a *résumé* of the history of the Turks and their subject races, which will be useful at the present juncture; he is careful to distinguish between the corrupt Government and the nation of the Turks, the three great vices which poison the Government of Constantinople—apathy, procrastination, and venality—he traces from the Byzantine Empire. The nation at large, as shown by the Turkish rank and file, is distinguished by patience, discipline, sobriety, bravery, honesty, and modesty.

> "To these qualities," says the author, "I may also add that of humanity, although I know it will excite an indignant exclamation from many at the present moment. But look at the Turkish soldier in private life, and you find him gentle and kind to children and women, and exceedingly fond of animals. His first thought, after a long and tiring day's march, is his horse. As soon as he has made the animal comfortable, then he thinks of the man."

The chapters on the Army and Navy, on Taxation and Agriculture, are valuable, and that on "Turkey as a field for Emigration" original; but at present the subject of emigration must remain in abeyance, till the country is relieved from the curse of war.

The late Miss Muir Mackenzie (afterwards Lady Sebright) and Miss A. Paulina Irby published, in 1867, their travels in the Sclavonic provinces of Turkey. This work Miss Irby has revised, and added to it three chapters on Bosnia in 1875, 1876, and 1877. The prolific pen of Mr. Gladstone has contributed a Preface to this edition. We are inclined to think this is to be regretted, as it gives something of a partisan character, which it is desirable to keep out of books written for the information of the public. We cannot doubt that Miss Irby's wish is to state facts as they are, and the strong views of the late Premier have been published so widely that they give to all in which he takes a part a one-sided character.

It must have required unusual courage and enterprise on the part of these ladies to undertake the adventurous journey they did in 1863 and 1864, and we believe it was the interest inspired by what she saw of the Serbs in her travels that led Miss Irby to the philanthropic works amongst them which have placed her name among those who are at the present time most justly honoured for their good deeds.

Miss M. Mackenzie and Miss Irby begin the recital of their travels at Salonica, and, except a visit to Rilo Monastir, they travel over entirely different ground from Colonel Baker. After visiting much of Bosnia, they pass to Northern Albania, and end with Montenegro. The incidents of their journeys are minutely and pleasantly related, and interspersed with much interesting information about the people, their history and legends. Although these ladies state that one contracts in the East the habit of crediting but half what one hears, yet their ears were always open to receive accounts of Turkish misdoing. They seem themselves, however, to have met with civility and attention from the Turkish authorities, to whom the sight of two unmarried women travelling without any male relation must have seemed strange, not to say incorrect.

Perhaps the most interesting part of this book is the visit to Montenegro. Those who go there must be prepared to rough it, and the roughness, which by the cold of winter was increased to positive hardship, was very gallantly borne by these ladies, who were certainly superior in courage and enthusiasm to the Prince's French doctor—

> "who came to see us the morning after our ride to Rïeka, and having ascertained that we were none the worse, poured forth the recital of his own grievances. 'Je vous dirai, mesdames,' he began, 'that you must have excellent constitutions not to have suffered from the effects of that storm. For myself I confess that life in Montenegro does not suit me; for the last three weeks I have had a cold; I am lodged with my wife and child in a single room. When it is bad weather we cannot go to dinner at the palace. Yesterday evening, for example, it was impossible to cross the road. During last night, from the violence of the tempest, the house rocked to its foundations.' We could not resist answering that his experience of life in Montenegro doubtless increased his admiration for the Montenegrines, who, during centuries, had borne what he bore, and worse, rather than submit to the Turk. 'Pardon,' interrupted he; 'that is a sentiment to which I do not aspire. Often I ask myself, Qu'est-ce que c'est que la liberté Monténégrine? Cannot any one be independent who chooses to dwell on the top of a rock? I avow, rather than cultivate such liberty, I would a thousand times be subject to the Turk.'"

Of this most interesting people, the Rev. W. Denton gives an account which has previously appeared in the *Church Quarterly Review* and in *Good Words*. He has himself travelled in Montenegro, and he quotes largely from other travellers. He concludes with a short history of the principality. For nearly 400 years that history has been one long-continued struggle with the Turks. First under their hereditary princes, then for 180 years under the Vladikas, or prince-bishops, and, lastly, under a restoration of hereditary lay princes, the almost uninterrupted war has continued. Cramped up in their rugged mountains, debarred from communication with the sea by the jealousy of Austria, made the tool of other States—first Venice, then France, and lastly Russia, who have none of them been of use in the hour of real need, this gallant people owe their liberty to their own prowess and unconquerable spirit. Mr. Denton's little book is a useful one, and will, we doubt not, be widely read.

BULLETIN DE LA SOCIÉTÉ DE GÉOGRAPHIE DE PARIS.

April 1876—*April* 1877.

The monthly *Bulletins* issued by the Paris Society during the year under review contain many papers of considerable interest. We cannot do more, in a brief notice like this, than indicate the subject-matter and scope of the more important of them.

Foremost among these we must draw attention to a disquisition on the Basque people, by M. V. Derrécagaix, of the French Staff. The author describes the present extent of the race and its site; he notices the principal works on its origin and history, and the different theories that have prevailed regarding this singular people. Among these he draws special notice to that elaborated by M. Augustin Chaho, a Basque by birth, who, in his *History of the Basques*, has pointed out that four names of tribes and twenty-five names of towns mentioned by Strabo and Ptolemy as existing in Northern Africa are to be found at the present day in the Basque country. This discovery induced M. Chaho to look for some analogy between the Sanskrit and *eskuara*, or ancient Basque tongues, and he has picked out about fifty words, which include such terms as mother, father, son, water, fire, east, hand, sun, &c., and which are *almost identical* in the two languages. This is a very important discovery, as Mr. Freeman and other historians have certainly denied that the Basques were of Aryan origin. M. Chaho's theory is that the Basques are descendants of the Iberi, who migrated, upwards of 2400 years before Christ, from Central Asia, the cradle of the Aryan race, by way of Northern Africa, where they have left traces, into Western Europe, where they were seen by the Phœnicians in the 18th and 19th centuries preceding the Christian era.

An article, by M. de Sainte Marie, on Herzegovina, descriptive of several routes through the province, of its antiquities, and of the manners and customs of the people, claims attention. M. J. B. Paquier devotes a thoughtful article to a consideration of Marco Polo's route across the Pamir, between Balkh and Yarkand. He is disinclined to believe that Marco Polo visited Pashai and Chesimur (Chitral and Kashmir), owing to the meagreness of the details he gives about the country, and his silence respecting the majestic Hindu Kush, which he would have had to cross. M. Paquier also argues that Ser Marco could not have followed the same route as that followed by Hwen Tsang, from Badachan eastward, as his description of the fertility of the pasturage, beside the river, agrees much more with the description given by Captain Trotter's Munshi of the Suchán River, than the bleak picture of desolation given by Hwen Tsang and Captain Wood of the route followed by them. A lake, of the dimensions of the Dragon Lake of the Chinese pilgrim, would most probably have been noticed by Marco Polo, had he passed it. M. Paqueir goes on to trace the Venetian traveller's route by way of the Vallis Comedarum (the Shignan Valley), the Turris Lapidea, and the Statio Mercatorum. He does not consider that Marco visited either Samarcand or Kashgar, and this he supports ingeniously by the language used at the commencement of chapter xxv., as constrasted with chapters xxxiii. and xxiv., and which seem to prove that Marco Polo tarried in Badakshan to describe some of the better-known cities in the vicinity, and then proceeded on his journey towards Yarkand. Among the other articles are a description of certain antique sculptures found in Lower Morocco, and a careful and detailed account of the vilayet of the Danube, by the French Consul at Rustchuk, from which it appears that the whole population of this vilayet amounts to about 2,152,500. We have five letters from the pen of the Abbé Desgodins, on the geography of Indo-China and the south-east limits of Tibet. Bonga, which, according to Schlagintweit, is situate about 28° 30′ N. latitude, the Abbé's information leads him, with some confidence, to place south-west of Yerkalo, the latitude of which has been ascertained by him to be 29° 2′ 40″ S. The Abbé goes on to disprove the idea that either the Makong or Salwen can have anything to do with the Brahmaputra, and with regard to the mountains separating the first two rivers, he states that, from his own observation, he can testify to the existence of such a chain, as well as to the existence of another between the Kinsha Kiang and Mekong; and that, from native information, he is inclined to believe in the existence of a third mountain range west of the Salwen, and forming the watershed of the Irrawaddy. The Abbé is further of opinion that these two or three mountain chains have no connection with the Himalayas system, but are probably the southward prolongation of the mountains which bound Tibet, on the north, and turn abruptly southward at about the 95th meridian of longitude. Dr. Harmand records the results of his journey up the Mekong River as far as the Khong Island, and his excursion thence into the Siamese and Cambodian provinces westward. The recent census of India, and the publication of various statistical works concerning the country, gives opportunity for a paper on the density of population in India, by M. Paul Vidal-Lablache, and the progress of M. Savorgnan de Brazza's expedition up the Ogowé River in Western Africa, forms the subject of three articles. To the last *bulletin* which falls within the scope of this notice, M. Ch. Maunoir, secretary to the Central Commission, contributes his annual review of geographical events during the year 1876.

The notes and communications which appear in each number are far too numerous to enable us to notice them separately, but they, in combination with several most excellent maps, prove that, for the variety and interest of its contents, this geographical publication is surpassed by none other.

———:o:———

Handbook of the Seat of War. Edited by *Alexander Mackay, LL.D., F.R.G.S.* (London: Simpkin, Marshall & Co., 1877).

We commend this practically useful little work to all interested in the progress of the war now being waged between Russia and Turkey. It has been compiled to enable the readers of war telegrams in the daily newspapers, and who have neither the time nor the opportunity to consult encyclopædias and gazetteers, to follow intelligently the movements of the rival armies. It contains brief descriptions of the localities occupied, or likely to be occupied, by either army, and, with the view of making the relative positions of the contending forces still clearer, sketch maps or plans of the occupied districts have been introduced. A good general Map of the Seat of War is also appended. The low price at which this handy work is issued places it within the reach of all.

Cartography.

INDIAN MARINE SURVEYS.

THE organisation of the very important department of Indian Marine Surveys, under the superintendence of Commander A. D. Taylor, has been so closely followed, step by step, in the pages of the *Geographical Magazine*, that we need only refer to these for a full account of it, especially to the article in the numbers for July, 1874, and April, 1877. Its officers are now vigorously prosecuting the heavy task of making up for the twelve years of neglect which followed on the cessation of the surveys of the Indian navy, in extending the yet incompleted charts of the coasts, and in re-surveying those ports and harbours in which changes are constantly being effected by natural and artificial means.

The first fruits of their work, in the form of a number of admirable charts of important points of the coast of India, are now before us.

We have first two sheets of a most useful and carefully executed general chart of the coasts of India, on the scale of about 20 miles to an inch, compiled by Mr. Carrington, superintendent of the drawing branch of the survey in Calcutta, from the original surveys made by the officers of the Indian navy from 1835 to 1862, and engraved at the Admiralty, at home, under the direction of Captain Evans. A most remarkable physical feature of the great Indian promontory, brought out very distinctly by this chart, is that of the wide level submarine plateau, of less depth than 100 fathoms, which extends all along the western coast from off the mouths of the Indus, where it is a hundred miles broad, to Cape Comorin. On the landward side the Western Ghauts rise suddenly to an average height of 4,000 feet, and seaward, immediately beyond the edge marked out by the line of 100 fathoms depth, there is a second sudden step or descent to depths of 6,000 and 12,000 feet.

The chart of the open roadstead of Kolachel, never before surveyed, whence the coffee of Travankor is exported, is a most important work, and the value of the new survey of the roadstead of Madras can hardly be overrated. The latter chart shows the limits of the proposed harbour of Madras. The continual alterations and changes of shape in the channels, sand spits, and mud flats of the mouth of the Godavery, effected by the conflict between the freshets of the river and the heavy monsoon surf of the Bay of Bengal, will illustrate the absolute necessity for uninterrupted attention and the periodical examination of such points by surveying vessels on this coast. The charts of a few years back are not only useless, but misleading.

Of all the inlets of the Indian coast there is none of greater importance than that of the Hoogly mouth of the Ganges, the great highway to Calcutta, dangerous on account of its shifting sands and rapid river current. Accordingly, no work could have been of greater public utility than that of a minute survey of the shoals which lie in the bed of the river round Hoogly Point, a task which has been accomplished by Lieutenant Coghlan and six other members of the surveying staff.

Lieutenant Jarrad's chart of the approaches to Rangoon River is another most notable work, completed in the face of formidable difficulties. While engaged on this survey, Lieutenant Jarrad wrote:—"Nature appears to have set her face against any interference with the Rangoon River and its secrets: when it does not blow, and the tides take off, we get fog so thick that we cannot see the forepart of the ship. The tides are so strong that tide-poles are continually being washed away; the steam-cutter cannot force the strength of the tide, and we can only sound for about an hour at slack water." In spite of this, however, the chart is here, and the river mouth, over an area of more than 200 square miles, has been sounded over in every corner.

Farther south, we have now for the first time a reliable chart of the Tavoy River, one of the chief central inlets of the Tenasserim Province. Very interesting, as an evidence of the advancement and enlightened policy of the ruler of the independent country of Siam, the coast-line of which continues that of the British Burman Provinces, are the two charts named last on our list, those of Salang Island and its chief harbour, from surveys made by Commander Richelieu, of H.M. Siamese Navy. The first is not only a chart of the coast of Salang, but is filled in on a minutely-detailed map of the interior of the island.

All these charts, whether engraved at home, or photozincographed in Calcutta at the office of the Surveyor-General, are produced in a strong, clear fashion, with large lettering and sounding figures, that may be read easily under the most adverse circumstances of rough weather or dingy cabin lights.

1. India—West Coast. Sheet I. Karáchi to Vingorla. Compiled from surveys made between 1835 and 1862, by R. C. Carrington, 1876. Admiralty, February, 1877.
2. India—West Coast. Sheet II. Vingorla to C. Comorin. Compiled from the latest Government surveys, by R. C. Carrington, 1876. Admiralty, February, 1877.
3. India—West Coast: North Konkan: Sketch of the entrance to the Rajpuri River. By Navigating-Lieutenant W. P. Haynes, R.N., 1876. Scale, $\frac{1}{30000}$. Calcutta: Marine Survey Department, July, 1876.
4. India—West Coast: Sketch of Quilon Roads. By Lieutenant A. Dundas Taylor, I.N., 1858. Scale, $\frac{1}{30000}$. Calcutta: Marine Survey Department, April, 1876.
5. India—West Coast: Travankor: Kolachel Roadstead. Surveyed by M. Chapman, I.N., 1875. Scale, $\frac{1}{7250}$. Calcutta: Marine Survey Department, November, 1875.
6. India—East Coast: Madras Roadstead. Surveyed by Navigating-Lieutenant F. W. Jarrad, R.N., assisted by Mr. P. J. Falle, October 1876. Scale, $\frac{1}{3840}$. Calcutta: Marine Survey Department, December, 1876.
7. Bay of Bengal: Coringa or Cocanada Bay, showing the Northern Godavery mouths. Surveyed by Navigating-Lieutenant G. C. Hammond, R.N., June to August, 1875. Scale, $\frac{1}{30000}$. Calcutta: Marine Survey Department, January, 1876.
8. Bay of Bengal—Hoogly River: Luff Point to Anchoring Creek, showing the James and Mary Shoals, and the entrance to the Roopnarain. Nat. Scale, $\frac{1}{12110}$. Surveyed by Navigating-Lieutenant J. E. Coghlan, R.N., April and May, 1875. Calcutta: Marine Survey Department, January, 1876.
9. Pegu—Gulf of Martaban: Approaches to Rangoon River. Scale, $\frac{1}{48400}$. Surveyed by Navigating-Lieutenant F. W. Jarrad, R.N. Admiralty, July, 1877.
10. Bay of Bengal—East Coast: British Burma: Tavoy River, from a sketch by Lieutenant R. Moresby, late Bombay Marine, with additions by Commander A. Dundas Taylor, late I.N., Superintendent of Marine Surveys in India, 1876. Scale, $\frac{1}{94270}$. Calcutta, October, 1876.
11. Bay of Bengal—Coast of Tenasserim: Kopah Inlet. Scale, $\frac{1}{800000}$. From a sketch by Commander A. Dundas Taylor, 1876. Calcutta, December, 1876.
12. Siam—West Coast, Malay Peninsula: Salang Island (Junk-seylon). Surveyed by Commander A. de Richelieu, H.M. Siamese Navy, 1876. Scale, $\frac{1}{80000}$. Calcutta, February, 1877.
13. Siam—West Coast, Malay Peninsula: Junk-seylon, East Coast: Puket or Tonkah Harbour. Surveyed by Commander A. de Richelieu, H.M. Siamese Navy, 1876. Calcutta, October, 1876.

Log Book.

Forest Conservancy in New Zealand.*—Captain Campbell-Walker deserves the thanks of all who take an interest in the future of New Zealand for his efforts to bring home to the colonists the importance of the question of Forest Conservancy, and to induce them to put an end to the heedless waste which is gradually thinning the country of its trees, and leading to future disaster. Forestry is a subject about which, as a rule, people are wofully ignorant, and it is not, therefore, surprising that Captain Campbell-Walker had to treat the audience he addressed to the elements of the subject, into which it is not our intention to follow him. All he says is admirably put, and should bear good fruit. Were it not for the bearing of forests upon the permanent water supply, upon the agricultural wealth of the country, and the health of its people, forestry might be left to private enterprise, and individuals might be allowed to hack and hew to their hearts' content; or, were it not for financial considerations, forest conservation would meet with less opposition from those who regard only present gains, and would leave the future to remedy the follies of the past. These two aspects of the question, the climatic and the financial, form the text of what Captain Campbell-Walker has to say, and he emphasises the lesson he would teach by alluding to the experience of other countries, especially that of France, which has suffered cruelly from the effects of a long course of denudation, and is now trying energetically to retrieve the errors of the past.

The area of forest Crown lands in New Zealand is estimated at 12,000,000 of acres, out of a total of 66,000,000, and it is satisfactory to learn that no damage has yet been done to the climate of the country, or its water supply, by the extensive clearings which have taken place: indeed, Captain Campbell-Walker estimates that probably nine-tenths of the forests that remain may in time be spared, if the clearances be judiciously carried out. While the permanent reserves are being selected—a work, of course, requiring time—Captain Campbell-Walker would have the tracts not suited for that purpose thrown open in such a way as to secure the timber its marketable value, and he is rightly opposed to the present system, by which vast quantities of valuable timber are sacrificed, merely to attract settlers to localities which are really not ripe for settlement. He would regulate the lease of blocks of the Government Forest to saw-millers, and from every one else cutting Government timber for firewood, the upkeep of fences, &c., he would levy light dues in the shape of annual licenses. These regulations are so simple and expedient that one wonders there should be any hesitation in adopting them. Young communities are much to be envied for the opportunities they have of avoiding the mistakes of past generations. It remains to be seen whether New Zealand will profit by the timely warning now offered her.

Austrian Scheme for Arctic Research.—We are glad to perceive from the *Exploration* that the Austrian scheme for the establishment of stations of observation within the Arctic circle, as an aid to Polar exploration (see our number for April 1876, page 104), has again been brought forward, and this time appears likely to be carried into practice. Lieutenant Weyprecht, who commanded the Austrian Polar Expedition that discovered Franz-Josef Land in 1874, and Count Wilczek, one of the promoters of that Expedition, have announced to the Royal Society of Meteorology of Utrecht that they intend to undertake an expedition to the Arctic regions, which will be away for about twelve months, and that they intend to establish their station of observation in one of the northern havens of Novaya Zemlya. In addition to this station they recommend the establishment of several others at various points, choosing by preference points easily accessible, but situated in as high a latitude as possible. These conditions are most satisfactorily fulfilled in Spitzbergen, in about 80° N.; on the Siberian coast, near the mouth of the Lena, in about 71° N., one of the New Siberian islands being preferred; at the wintering station occupied by Maguire, near Point Barrow, east of Behring Strait; at Upernivik, in West Greenland; and, as intermediate stations, Novaya Zemlya, at about 76° N., and a station on the east coast of Greenland. A subsidiary station in Norwegian Finmark would be necessary to connect the stations in Spitzbergen with those on the continent of Europe. It would also be of the highest importance to establish some stations, or at least one, on the Antarctic borders. The most favourable points appear to be Cape Horn, the Kerguelen or Auckland Islands, or one of the islands to the south of the latter. The nearer the stations are to the Pole the more important would they, of course, be. Synchronous observations made at a series of stations so near the two Poles would throw valuable light upon the still very obscure subject of terrestrial magnetism and the theory of the Aurora Borealis. Such observations should have the first place, while important observations in other departments could be made, all in the end having a strong practical bearing upon meteorology. Each expedition ought to be allowed to determine for itself the extent to which observations should be carried relative to geography, natural history, and the physical sciences, for which simultaneous observations are of less importance.

The American Arctic Expedition.—We called attention to Captain Howgate's scheme for polar exploration in our number for April last. The expedition has since been successfully organized, and the final departure took place last month from New London, for Cumberland Island, the first stopping-place *en route* to Smith Sound. The winter will be spent on this island on account of its coal deposits, and the time will be occupied, not only in meteorological and other scientific observations, but in equipping the future colony by engaging some dozen families, with their sledges and a full supply of dogs, together with abundant clothing, to be made up by the native women. Next summer the 'Florence' will transport the entire company to Disco, where they will be transferred to a ship which is expected in June, bringing colonists sent out under Government auspices, with Lady Franklin Bay (the 'Discovery's' head-quarters) for their final destination. The present outfit is wholly private, except that the Signal Service Bureau has lent some of its instruments, and Commodore Ammen, of the Bureau of Navigation, has provided his combination sledge and safety raft. Captain Howgate has Captain Geo. E. Tyson, of 'Polaris' fame, for his sailing-master; Mr. Ludwig Kumlein, for his naturalist; and Mr. O. T. Sherman, of Providence, for his meteorologist and photographer. It is expected that Congress will assent to an appropriation of $100,000 next session for the Howgate colony.

---

* *State Forestry:* a Paper read before the New Zealand Institute, Wellington, March 17, 1877. By Captain Campbell-Walker, F.R.G.S., Staff Corps, Conservator of State Forests, New Zealand.

Colonel Macgregor and Captain Lockwood in Eastern Persia.—No news has been received by the India Office of the recent journey made by Colonel Macgregor and Captain Lockwood through Khuzistan and Baluchistan to India. In addition, however, to the interesting discovery of an active volcano south of Sistan (chronicled in the Log Book of our last number), we learn some further details respecting their journey from a letter received by Dr. Petermann from Major St. John, R.E. This officer, writing under date 12th June, remarks that though Colonel Macgregor and Captain Lockwood were not in a position to make detailed surveys, they have yet confirmed the existence of the great mountain range running westward of the Sistan Lake, as well as the fact that there are three smaller ranges parallel with the southern bend of the Helmund. Another interesting discovery lies in the fact that the three rivers, the Mashkid, Lura, and Budur, lose themselves in different *hamuns*, or depressions of the desert, and neither unite one with the other, nor with the great Sistan Swamp. These *hamuns* appear to correspond pretty closely with the Persian *kawirs*. The India Survey Department is engaged on a tolerably large scale map of the Khan of Kelat's dominions, which it is hoped will embody all these interesting explorations.

Exploration in Eastern Turkistan: Kurapatkin and Prejevalsky.—M. C. de Ufalvy has communicated to the Paris Geographical Society details of Captain Kurapatkin's journey in Kashgaria. This officer started from Osh (Ferganah) on the 17th (29th) July 1876, and crossed the Terek pass leading into Kashgar. He makes out this pass to be 12,209 feet, or lower than the usually received height (12,600 feet), and practicable throughout for an invading army with cannon. Captain Kurapatkin was wounded by Kara Khirgiz close to Gulcha, and forced to return to Osh. After crossing the Terek again, he arrived at Kashgar on the 8th November (N.S.). Here he was put under temporary arrest by Yakub Beg's son, Kuli Beg, but was soon released, on the promise of leaving the country forthwith. This stipulation he did not comply with, and, following the Kashgar Daria, he passed Maralbashi (the furthest point reached by Captain Biddulph, of Sir D. Forsyth's party) to Aksu. For 42 miles beyond Kashgar the country is cultivated. A special manufacture in these parts is a thick kind of cloth called *matta*, which is said to be exported to the extent of 333,000*l.* annually. The river is fringed on either hand, for more than 120 miles, with thick forests of *populus diversifolia*, which attain a height of about 12 feet. Tamarisks are also frequent, and a strong species of salt is plentiful. Maralbashi is a strong fortress, and important from a strategic point of view, as it commands the Kashgar, Yarkand, Khotan, and Asku roads. Here and there are small cultivated oases, tenanted by six, seven or more individuals engaged in the postal service. Kurapatkin arrived at Kurla on the 10th January 1877, after leaving the banks of the Kashgar Daria and crossing a stony and sandy desert. Kurla, though not to be found on existing maps,* is an important place of some commercial note, while Karashahr is a mere hamlet. From Kurla to Lob-nor it is 250 miles. Kurapatkin's brother and M. Wilkens, a naturalist, visited the lake Bostang-nor of our maps, the real name being Baratch-kul. Yakub Beg was at Kurla at the head of 17,000 of his troops. M. Ufalvy gives some particulars respecting the "six towns" of Altishahr (as Kashgaria was called in the 15th century), which differs in some respects from the account given by Mr. Michell at page 195 of our volume for 1874, and he adds some particulars of the late Yakub Beg's life. The regular army, he tells us, are 35,000 in number, and pretty well armed and disciplined. They have 4000 breech-loaders, eight European mountain guns, and twenty others of native make. The troops are described as generally discontented, and receiving neither pay, uniform, nor rations, but the Chinese army, it is said, is no better off. Captain Kurapatkin left Kurla on the 18th February, and returned to Osh on the 13th April last.

Colonel Prejevalsky does not appear to have sent his promised telegram from Kuldja as yet, though he succeeded in arriving at that place in safety. M. Ufalvy communicates several details respecting Prejevalsky's explorations which have not found their way into the meagre telegrams reproduced in the Russian journals. The Colonel started from Kuldja, and, having ascended the valley of the Tekes, crossed over into that of the Yuldus to Kurla. Here he was detained in durance by the Governor for eleven days, whence, on release, he started for Lob-nor. He crossed the Tarim River where it was 66 yards wide and very deep. At a distance of 250 miles from Kurla, and south of Lob-nor, he came upon a village called Chargalik, inhabited by sixty-six families, the people of which call themselves Lob-nortsi; they are a peaceable folk of Kalmuk origin, and are exclusively fish-eaters. Lob-nor is an enormous marsh surrounded and partly overgrown by thick bushes. Prejevalsky killed a tiger there and many birds. Traces of Russian dwellings were found, as anticipated; about sixty Siberian families had migrated thither about ten years ago, and remained there for six or eight months. They then departed in the direction of Hami, and have since been lost sight of

---

* This is a misapprehension. Kurla will be found on the "Preliminary Map of Eastern Turkistan," accompanying Sir Douglas Forsyth's narrative of the Yarkand Mission. We have not yet, by-the-bye, seen the complete map of the region referred to. It would be a most welcome document to geographers. But perhaps it might now be worth while to wait for Prejevalsky's results.—[Ed. *G.M.*]

About 120 miles south of Lob-nor, Prejevalsky came upon a range called the Altyn-Tag, which rises to a height of more than 10,000 Russian feet, and appears to be the outlying spurs of a more important range. It was in these parts that the wild camels were met with.

These camels (as it appears from a letter published in the *Globus*, from Herr Albert Regel, dated Kuldja, 25th May (6th June, N.S.), are about the same height as tame ones, but their hair is much shorter and thicker. Herr Regel saw Prejevalsky's interpreter and ascertained that the expedition has produced more geographical results than specimens and collections. Prejevalsky proposed to stay for a while by the Kunge, the right affluent of the Ili River, and then to start from Kuldja for Tibet, by way of Chinese territory.

Lhasa.—We are sorry to perceive from the Indian *Pioneer*, of the 22nd June last, that the proposed expedition to this mysterious and sealed capital has now fallen through beyond hope of success. We have been aware for nearly a year past that negotiations were on foot between Mr. Ney Elias (an *attaché* of the Indian Foreign Office) and the Indian Government, for a private attempt to penetrate, if not to Lhasa, to certain other interesting quarters of Tibet; but as the enterprise was a dangerous and delicate one, we refrained, in the interest of the undertaking, from publishing anything on the subject. As, however, the matter is no longer a secret, it is necessary, in the interests of future similar projects, to observe how the present one has been wrecked. The Government of India were not unwilling at the outset to open out relations with Tibet, but their method of procedure certainly forces on us the impression that they did not wish to appear in the matter until success had been assured. They had at their elbow an experienced explorer in Mr. Elias, and offered him the opportunity of carrying out the project as a private individual, at his own risk and responsibility. The offer was accepted, on condition that all arrangements for the journey and negotiations with the Chinese Government should be left in the traveller's own hands, to the end that he might not be suspected of being a Government agent. Unfortunately, this *modus operandi* did not commend itself to the authorities. Her Majesty's Minister in China was communicated with, the project was placed before the Chinese Government, and the "private traveller" was, in plain English, handed over to the "enemy."

It so happened, however, that just at that time (Sept. 1876), the Convention of Chefoo was being negotiated, and, on the basis of Mr. Elias' project, a separate article was inserted providing, officially, for a mission to Lhasa. Nothing could have come more opportunely to retrieve the faults of the Indian Government: Mr. Elias would go with the full sanction of the Chinese Government; but as the convention was only to come into force six months after conclusion, a delay occurred, during which time it was settled between the Indian officials and the Peking Minister that Mr. Elias, not being a regularly-appointed officer of Government, was not entitled to use the official passport, and, as a private exploration was now out of the question, the matter must be dropped.

Now, either a person is an officer or he is not; and if he is so far considered an officer that his plans for a private journey must be placed before the very people from whom it was desirable to keep them secret, it is hardly clear why he should not be entitled to the use of a safe-conduct when obtained from those people by negotiation. However this may be, the question of an expedition is at an end, and the field of Tibetan exploration is left open to our Russian friends, who know how to manage these things far better than we do. The *Pioneer* thinks there may yet be a chance for our Government to retrieve, but it will not be easy to find a better opportunity than the one so unfortunately thrown away.

Expedition through Mongolia.—M. Potanin started on his expedition to explore that part of Mongolia between Zaissan and Lake Kossogol, on the 1st of April last (N.S.). He expects to complete his examination of Mongolia, as far as it borders on the Siberian frontier, in the space of two years.

The Portuguese Province of Mozambique.—According to G. A. Pery, in the *Geographia e Estadistica Geral de Portugal e Colonias* (Lisbon, 1875), the following nine districts form together the East African province of Mozambique:—

1. *Cape Delgado*, consisting of the Querimba Archipelago, and the following possessions on the mainland:—Mazimba (Mucimba), Pangane, Lumbo, Quissanga, Montepes, Areemba, and the colony of Pemba.
2. *Mozambique*, consisting of the island of Mozambique, and a portion of the opposite mainland, with the hamlets of Mossuril, Cabaceira Grande and Pequeña, and the territories of Sancul and Quitangonha. The rule over the people of the surrounding forests is only nominal.
3. *Angoxa* (Angosha) from the Rio Sangage (Sangaje) to the Quizumbo (Quizungo), including the little town of Angoxa and the Angoxa and Primeira Islands (Casuarina, Fogo, Silva, &c.).
4. *Quelimane*, from the Rio Quizumbo in the north to the E. Luabo mouth of the Zambesi, in the south, and the Rio Chire (Shire) in the west.
5. *Sena* (Senna), bounded on the north by the Rio Chire (Shire) and a portion of the Zambesi; in the west by the Aroenha (Luenya ; in the south by the small river Mussunguri and the heights of Barue.
6. *Tete*, bounded on the north by the Rio Aruangua (Loangwa); on the west by a part of the Zambesi and the Rio Siniati (Sinyati, 29° E.; Livingstone); on the south by the Serra Fura and the heights of Manica; on the east by the district of Sena.
7. *Sofala*, extending along the coast from the Rio Mussunguri to Cape St. Sebastian, including the island of Chiloane and the Bazaruto Archipelago.
8. *Inhambane*, bounded on the west by the Transvaal Republic.[*]
9. *Lourenço Marquez.*

---

[*] See, however, St. Vincent Erskine's account in the *R. G. S. Journal*, 1875, p. 53:—"Inhambane possesses the rule over a tract of country north and south of the town about 70 miles long and 15 broad, whereas the Government at Lorenzo Marquez can call nothing their own beyond the space within range of their cannon."

Romolo Gessi.—From a Bolognese serial, entitled *Pagine Sparse*, we learn that this Italian traveller, the circumnavigator of Lake Albert Nyanza, was born at Ravenna in 1830, and that at an early age he was sent to Vienna, to the Military College of Wiener Neustadt. He was always of a roving, ambitious temperament, and took part in the events of 1848, during which he was taken prisoner by the Austrians, and, after temporary durance in Transilvania, was exiled into Rumania, whence he and his fellow-companions were not long in making their way back to Venice. After the fall of the city, Gessi entered the mercantile marine, and, in the course of some adventurous voyages in the Mediterranean, made the acquaintance of Mazzini at Corfu. In 1854 he took service in the Turkish contingent against the Russians, and was present at the Alma, Inkermann, Balaklava, and the taking of Kertch. On the conclusion of the war he embarked for Circassia, where he stayed till his corps was utterly routed. Toward the close of 1856 he was occupied in raising sunken vessels at the Sulina mouth of the Danube, and after that he enlisted in the Polish Legion, which was attacked and made prisoners while endeavouring to make its way to Poland from Turkey. Gessi returned to Turkey, and there made the acquaintance of Colonel Gordon, who, when appointed to the governorship of Central Africa, hastened to avail himself of Gessi's services. His subsequent successful exploration of the Lake Albert Nyanza is well known, and was described by us in our number for September, 1876, p. 247. He received a warm welcome among his fellow-countrymen in Bologna in July last, and has already started for Colonel Gordon's head-quarters in Central Africa.

Journey along the Southern Coast of New Guinea.—The Rev. S. Macfarlane has communicated to the Royal Geographical Society particulars of a journey made by him to the China Straits in New Guinea in March last in the steamer 'Ellangowan.' After steaming through Basilisk Passage the 'Ellangowan' anchored in Hood Bay, where the natives visited them in large numbers, and were very friendly. From these they ascertained that a river runs into the lagoon at the eastern side of the Bay, and that it takes its rise behind the Astrolabe Range. The lagoon is described as about 15 miles in circumference, and a splendid anchorage, while the river was about 80 yards wide and 8 feet deep. Journeying eastward the 'Ellangowan' anchored in Cloudy Bay, and thence proceeded towards Dufaure Island, close to which is a fine harbour about 8 miles by 4, and from 8 to 10 fathoms deep. Along the coast between Amazon Bay and China Straits the natives are more numerous, more intelligent and healthy, and altogether compare favourably with the natives to the westward. Although Mr. Macfarlane did not feel justified in making detailed surveys, he was enabled to detect many necessary modifications in the charts, and is of opinion that there is still plenty of work for one of Her Majesty's ships along the southern side of the peninsula. Mr. Macfarlane was unable to go beyond the China Straits, as his supply of hoop-iron, which is eagerly sought after by the natives, ran short. He considers that the voyage has been a most successful one, resulting in the discovery of two splendid harbours, besides several good anchorages along the coast. The natives were found to be friendly, numerous, and apparently had plenty of food. They brought some flax of a superior quality, which eventually might become an article of commerce. Mr. Macfarlane remarks that the eastern end of the peninsula with the islands in the vicinity, including the d'Entrecasteaux group, will form a much finer field for missionary operations than the Gulf with its dangerous navigation, deadly fever and savage cannibal inhabitants.

Kanitz's New Map of Bulgaria.—The long-expected map, showing the result of F. Kanitz's travels in Bulgaria (1870-1874), is reproduced in Dr. Petermann's *Mittheilungen* (No. IX., September). It is reduced from Kanitz's original drawing to the scale of 1:625,000, or between 9 and 10 miles to the inch. It embraces Danubian Bulgaria, the Balkan Range, and South-eastern Servia. It is bounded by the Danube on the north, and by a line connecting the towns of Nissa, Sofia, Kazanlik, and Misivri on the south; on the west it extends as far as Alexinatz and Negotin, and on the east as far as the Black Sea. Kanitz crossed the Balkans at no less than eleven different points, and, as his routes form a perfect network over the country, his new map is undoubtedly a most valuable contribution to the geography of Bulgaria.

New Russian Maps of Turkestan.—Among the chief Russian maps of Turkestan submitted this year to the Emperor for inspection should be mentioned one in thirty-eight sheets, on the scale of 1:84,000 (about $1\frac{1}{3}$ mile to an inch) of the Alai and northern Pamir, embodying the results of the recent military and geographical expedition thither: a map of the mountainous region between the provinces Syr-Daria and Ferghana, on the scale of 1:210,000; a general map showing all surveys executed in Turkestan during the year 1876, with plans of Khokand, Margilan, Osh, and other towns; a detailed survey from Bokhara to Charjui on the Amu, made by Captain Chernefsky, with the object of seeing whether it would be possible to irrigate the Khanate of Bokhara by means of canals drawn from the Amu instead of the Zerafshan. This proves to be impracticable, as the level of the Amu is lower than that of the land to be irrigated. M. de Khanikof, in communicating the above information to the Paris Geographical Society, remarks that we now possess accurate geographical information respecting the course of the Amu, from its delta in the Sea of Aral up to the confluence of the Kokcha.

AT a special meeting of the Geographical Society of Geneva, a national Swiss committee was formed, under the presidency of M. de Beaumont, in connection with the Central Committe at Brussels, for the purpose of forwarding the exploration of Central Africa.

ERRATUM.

In our last number the name "(USERE)" was inadvertently inserted on the map to the west of the Lake Nyassa. Usere is a port on the east coast of the Lake called Lisewa, by Young.

Proceedings of Geographical Societies.

BRITISH ASSOCIATION.

Section E.

The Geographical Section (E) commenced its sittings at the Wesleyan Schools, Saltash Street, on Thursday the 16th of August, under the presidency of Admiral Sir Erasmus Ommanney, C.B., F.R.S. The Vice-Presidents were Sir Samuel W. Baker, M.A., F.R.S., F.R.G.S., Major Wilson, F.R.S., Captain Verney, R.N., and Commander Cameron, R.N.; and the Secretaries, Mr. H. W. Bates, F.L.S., Assistant-Secretary R.G.S., Mr. Francis E. Fox, B.A., F.R.G.S., and Mr. E. C. Rye, F.Z.S., Librarian R.G.S.

The President's Address.

In his opening address the President remarked that it was his object to take a general review of the magnitude of geographical research, and the advance in geographical science which had been effected during the lapse of time since that great national Association previously assembled in that renowned town and great naval port of the West. He first, however, pointed to the change effected by the recognition of geography in the proceedings of the Association since the last meeting in Plymouth in 1841. Geography was then ranked only as a subordinate branch of one of the sections; it now formed a section of its own, and always commanded a considerable and increasing share of public interest, due, in a great degree, to the exciting and important revelations made by great discoverers, and the presence of many renowned travellers at the meetings. With a passing reference to the enlarged views now held by geographers in a more scientific direction, he proceeded to observe that geographical science had of late years received considerable impulse from the establishment of new societies on the Continent, and most especially from the inauguration of international congresses, destined to renew in a wide field of action all that had been so auspiciously established within the British Islands by our own Association. An excellent opportunity of comparing the position and methods of the past with those of the present day, in all that related to geographical investigation, was afforded by the Loan Exhibition of Scientific Instruments and Appliances, which was established at South Kensington last year. But, of all the inventions of interest to the navigator, was that produced by the genius of Dr. Siemens, "the bathometer," for measuring the depth of the sea without sounding lines. By means of this instrument, which can be placed in the cabin, the mariner can record, with the same ease as reading off the barometric pressure, the depth of the sea beneath him at a moment's glance.

In the year 1841 the triangulation of the British Islands was in progress: the great base line on Salisbury Plain, which was to be made the test of the accuracy of the work, remained to be surveyed: this base was laid down in 1849. The primary base line, on the margin of Lough Foyle, was 3 miles, and its length in the first instance was computed by a connected series of triangles projected on from Lough Foyle. When this base was measured by the standard compensation base, it was found that the actual measurement agreed within five inches of the length computed by the triangulation and trigonometry: this fairly expressed the accuracy which had now been introduced into this branch of surveying.

In the work of hydrographical progress we had ample reason to be proud of all that had been accomplished under the direction of those eminent hydrographers of the Admiralty—Beaufort, Richards, and Evans. During the same period our kindred across the Atlantic had taken up a very high position in this branch of knowledge. He deemed it opportune to accord a tribute of praise to the works of Captain Maury, of the United States, who had honoured them with his presence at the meetings of the Association, and with the benefit of his information. It was no less a duty to recognise the services of Admiral Sir Edward Belcher, who was a constant attendant at that section, and was a great contributor to the proceedings of the Association, and, as a marine surveyor, had left behind him a large amount of accurate work in all quarters of the globe.

At the very time that the British Association was holding its last meeting at Plymouth, Captain James C. Ross was engaged on his memorable expedition into the Antarctic Sea—a region replete with interest for discovery and scientific investigation. And to no better hands could it have been entrusted than to James Ross, who fixed the position, and planted the British flag on the north magnetic pole. The President reviewed in detail the work of Ross, who, on February 23rd, 1842, attained the latitude of 78·10 S., the highest southern latitude ever attained by man, and who approximately determined the position of the south magnetic pole. The knowledge of ocean physics and meteorology was also greatly advanced by that expedition. He next referred to Arctic exploration, reviewing the proceedings of all the expeditions which followed the unfortunate attempt of Franklin to force the North-West Passage, and especially those connected with the search for the luckless explorer. As an Arctic explorer he wished to express his unqualified approval at the conduct of Captain Nares in his wise decision to return home; nothing could have been gained by remaining out another season, and the able seamanship displayed in effecting the escape from such a perilous position was admirable, for it should be remembered that the three previous expeditions in this dangerous channel all ended in disaster and abandonment of vessels. Before quitting the glacial regions, he would venture to give his opinion with reference to future exploration. By the valuable information brought home by Nares as to the physical conditions of the palæocrystic ice, which he believed to occupy all the circumpolar area within the eighty-third parallel, all ideas of reaching the Pole from that direction, or anywhere north of the Parry Group, might be discarded; and he thought this formidable ice would arrest the voyager sooner or later in navigating towards the Pole. But, instead of nations racing for the Pole, let them accomplish what was practicable. To complete the coast line of North Greenland would be interesting to all geographers, namely, to connect the coast between Beaumont's farthest and Koldeway's north limit of discovery at Cape Bismarck, and might be accomplished from a winter station on the east coast. A scientific survey of Franz-Josef Land would be of great service to the interests of science. Payer observed a navigable sea from his extreme north position at Cape Fligeley between him and Oscar Land. Research in that direction appeared to hold out a hope of success in finding more land in that region. The Swedes were preparing an expedition to make a passage from Novaya Zemlya along the Siberian coast to Behring Straits. All must, however, admit that England retains the proud distinction of being the foremost nation in Polar research; and if Nares did not reach the Pole, his voyage had contributed largely to the sum of human knowledge.

Admiral Ommanney next briefly referred to the development of ocean telegraphy, the results of the 'Challenger' Expedition, and maritime meteorology. Directing attention to the Continent of Africa, he observed that Livingstone's last work of enduring toil was the discovery of the lakes Moero and Bangweolo, and following the watercourse of the Lualaba northward to Nyangwé. Upon his death the public feeling of this country to civilise the African, and to develope the productions of the country, greatly increased. Under Stanley, Gordon, and Cameron the great achievement had been attained of navigating the three great lakes. To Colonel Gordon was due the honour of placing a steamboat on the Albert Nyanza, completing the work which the gallant Baker, the discoverer of the lake, had so much at heart. Last of all, a tribute of praise must be accorded to Lieutenant Cameron for his marvellous journey, as being the first European who had ever crossed tropical Africa from the Indian Ocean to the Atlantic, a distance of about 3000 miles, 1200 of which was over new ground never before trodden by white man. On this route he defined the water-parting between the basin of the Lualaba and the tributaries of the River Zambesi. Another naval officer, Mr. E. D. Young, had also earned distinction as a traveller by exploring the Lake Nyassa, which he found to extend 100 miles further north than Dr. Livingstone had imagined. The most interesting problem now to solve would be to find the head waters of the mighty Congo, and connect it with the Atlantic. Schweinfurth, south-west of Khartum, reached the water-parting of the Nile basin tributaries, and discovered the sources of a river trending into Central Africa, named the Uelle, Could it lead to the Shari, discharging into Lake Chad, or would it prove to be the Ogowé, which discharges into the Atlantic near the Gaboon River?

Sir Erasmus next called attention to the international effort initiated last autumn by his Majesty the King of the Belgians at a congress held in Brussels, attended by Sir Rutherford Alcock, Sir Henry Rawlinson, and others, for the purpose of organising means for the systematic and continuous exploration of Africa, and with a view to encourage the interests of all civilised nations in the world in furtherance of such a desirable object. One of the results of the Congress had been that the Council of the Royal Geographical Society had founded an African Exploration Fund, under the patronage of H.R.H. the Prince of Wales, with an Executive Committee. The Council had prepared a circular, showing the course they intended taking in this great movement, and mode of raising funds.

After briefly referring to explorations recently made in Asia and Madagascar, and to the great achievement of Lesseps, in the construction of the Suez Canal, Sir Erasmus next touched upon New Guinea, the late survey of the eastern end of which was another instance of countries lying contiguous to civilisation which had never been surveyed until recent date; it was scarcely creditable to a great maritime nation, that more was not known of the New Guinea coasts, within eighty miles of her own territories. Missionaries and expeditions of a commercial character from Australia had attempted to establish settlements, but without success.

The rapid progress and development of America since 1841, and the colonization of Vancouver's Island, the opening up of Japan, and Baron Richthofen's most instructive work on China were next referred to; and, in conclusion, the President recognised the marvellous service which the growth of steam navigation had rendered to geographical science.

Sir Samuel Baker, in proposing a vote of thanks to Admiral Sir Erasmus Ommanney, adverted to the subject of African exploration. He remarked that in this work Englishmen had never failed in their part, except when the spirit was willing and the flesh was weak, and the travellers died on the way. England had peculiarly intimate relations with Africa, and, thanks to its colonial possessions and the influence it possessed with the Seyyid of Zanzibar, who, of all Oriental potentates, had shown the most honest desire to suppress the slave trade, it was better qualified than any other power to undertake the work of exploration. To conduct a number of expeditions at one time and from different centres, would involve enormous expense, and his advice was, that, in the future, the Society and the public should support one English exploring agency rather than a series conducted by various nations at one and the same time.

Sir James Alexander seconded the motion, which was unanimously adopted.

Western Siberia.

Dr. Lindeman, Hon. Secretary to the Bremen Geographical Society, read an interesting paper narrating the work done by the Bremen expedition in Western Siberia, sent out in 1876, under the command of Dr. Otto Finsch, whose narrative the paper to a great extent embodied. The expedition was presented to the Czar at St. Petersburgh, and proceeded thence, during the early spring, to Tobolsk, which place they reached on April 9th. Proceeding thence, they crossed the river Irtisch, at Omsk, the ice on which was not broken. Thence they proceeded across the steppes, which, at some places, were covered with a crust of pure salt, until they touched on the Chinese frontier. An amusing account of maladroitness of the Celestial archers in their bow-and-arrow practice excited some laughter. Later in the season the expedition turned northward until they reached the mouth of the River Ob, and, embarking here, explored the shores of the inlet of the Arctic Ocean, into which it flows, displaying the German flag for the first time in these waters. Turning westward, over a tract of desolate, boggy country, they reached the Ural mountains, and attempted, during August, to penetrate to the seashore here, but failed, owing to the want of a boat and the impassable nature of the country. The reindeer disease was at this time inflicting terrible loss upon the herds of the country, and even some human beings, including their guide in the Urals, took the infection. With regard to a proposed canal to connect the Ob with the western system of navigation, the expedition formed the opinion that such a work would be impracticable, owing to the long winter, the tendency of the rivers to rise and fall like mountain streams, and the difficult character of the mountainous country which intervenes. Large portions of the journey were performed on sledges, drawn by reindeer. Early in September they returned to Obdorsk, and, later in the month, to Semarov, whence, during the autumn, they proceeded home. To the paper was added an interesting review of the specimens collected by the expedition, including important discoveries both in vegetable and animal life.

Western Australia.

Mr. H. W. Bates, Assistant Secretary R.G.S., read a paper by Mr. W. H. Tietkins on "The latest Exploring Expedition across Australia." This expedition, under Mr. E. Giles and Mr. Tietkins, traversed the district lying between the settlements of South and those of Western Australia, and described the country as consisting very considerably of barren, treeless, and waterless wastes. Camels were used in the expedition, and, but for these animals, it would have been impossible for them to have proceeded. On two occasions they were attacked by savages, but the superior arms of the whites soon satisfied their enemies of the fruitlessness of the struggle. The leader, however, had once a narrow escape of being tomahawked.

Mr. Nicholls, who had travelled from north to south of Australia, said the sterility of large portions of the country would prevent settlement, and the water was often so affected by saline deposits as to cause instant death to any one partaking of it. The introduction of the camel for purposes of exploration was an important feature.

Mr. Trelawney Saunders protested against the dismal prospect presented, pointing out that the trade of Plymouth, which was a great port for emigration to Australia, would suffer if the affirmative answer was returned to that challenge—that the interior of the country was incapable of providing a home for Europeans; and pointed to the testimony of Mr. Lands-borough regarding the growth of forests in Australia, the consequent increased rainfall, and, as civilisation extended its influence interiorwards, the gradual reclamation of vast tracts of land previously considered barren.

Mr. NICHOLLS explained that Australia was a continent as large as Europe, that the inhospitable districts referred to were only a small fraction of its area, and that he was satisfied by far the greatest portion of its surface was rich and fertile. In answer to Sir SAMUEL BAKER, who described the properties and characteristics of the camel as the ship of the desert, Mr. Nicholls expressed his belief that the saltbush, which fattened sheep and cattle, would also offer sustenance for camels, and that if the bitter water of the lakes, which proved fatal to man and was avoided by the native animals, could be drunk with impunity by the camels, the deserts of Western Australia might be traversed just as safely and surely as the Great Sahara was crossed by the African merchants.

Friday, August 17th.

Vice-Admiral Sir ERASMUS OMMANNEY, K.C.B., in the chair.

EXPLORATION OF PALESTINE.

Major WILSON read a paper by Lieutenant Kitchener, R.E., entitled "Report of the Line of Levels from the Mediterranean to the Sea of Galilee." The levelling commenced in June 1875, but was soon interrupted by local circumstances. It was resumed in March 1877, and carried to a successful conclusion by Lieutenant Kitchener. There had, as yet, however, been no opportunity of applying corrections. The levels extended over 35⅞ miles, and the result of the work showed the depression of the Sea of Galilee to be 682·544 feet below the Mediterranean. Fortunately, they had a perfectly calm day for securing the sea level. The sea left a clearly-defined white mark at its highest part: the depression shown by Kitchener's observations was some 40 or 50 feet greater than had been generally supposed. The depression of the Dead Sea was 1292 feet, and between the two seas there was a fall of a little over 600 feet; this fall was nearly even throughout, although there were one or two rapids in its course. The deepest part of the Jordan Valley would be 1300 feet below the level of the Mediterranean.

Mr. EDWARD JAMES asked if the lecturer had any theory to offer as to what became of the enormous quantity of water brought down to the Dead Sea by the Jordan.

Major WILSON replied that there was no doubt that the whole supply was carried off by means of evaporation, which, in that latitude, and in a country 1300 feet below the level of the Mediterranean, was something enormous. No doubt the Dead Sea at one period occupied a much larger area than it does at the present time, for salts and other contents of the water were found at a considerable distance up the Jordan Valley. As evaporation went on the Dead Sea gradually subsided, until at last the evaporation exactly compensated for the supply. If the Dead Sea were examined at different periods of the year a well-defined tide-mark would be found. Its highest periods were when the rains fell and the Lebanon snows melted, and its lowest towards the commencement of autumn. In regard to the survey of Palestine, he might further say that the War Office quite recently had granted the pay of two or three men to work steadily at the map, and he hoped by next summer the whole would be drawn. The map would then be issued as quickly as possible.

OVERLAND ROUTE TO INDIA.

Captain MARSH read a paper "On a Journey Overland to India *viâ* Mash-had, Herat, Kandahar, and the Bolan Pass, in 1872." The gallant traveller, who made the journey entirely at his own cost, crossed the Caspian in a steamer to Ashurada, which is the head-quarters of the Russian fleet on that sea. Thence he returned to Resht, on the southern shore, where he found significant signs of the terrible famine which had devastated that part of the country. After some delay, in consequence of fever and the difficulty of obtaining means of conveyance, he, accompanied by two other Englishmen, went on to Tiflis, where they procured mules for their journey to Teheran. He gave a glowing description of the ruins of Kasvin, the former chief town of Persia, compared with which Teheran itself was insignificant and disappointing. After hospitable entertainment at the latter city by the British Embassy, Captain Marsh proceeded eastward, but at Sabzawar he came to a dead halt, as the country was overrun with Turcomans. Eventually, however, he proceeded to Mash-had, the holy city of the Shi-ite sect of Muhammadans, which was literally a heap of bones, for burial within the sacred walls of the city was regarded as a desideratum by the whole sect. He found it necessary here to purchase native costume in order to continue his journey eastward, and, amongst other stores, he took Liebig's extract of meat, which was a great standby in places where no animal food was obtainable. After six marches he arrived at the Afghanistan frontier, marked by a simple mud fort, in which he found people packed like herrings, owing to the recent raids of the Turcomans. There was some difficulty in getting away, but after joining a company of merchants he proceeded. In crossing the river forming the frontier he had a providential escape from the Turcomans, who had encamped in the jungle. From Herat, the Governor and his whole army came out to welcome the traveller, and he could not have received a more cordial welcome had he been the Empress of India or the Governor-General. Herat was the key of both Persia and Afghanistan. It had often been besieged, but, although frequently captured and depopulated, it was still very thriving. The fortifications were almost impregnable, and a native army commanded by English officers could hold the place against the world. Its present force was 5000 men, but that could be supported by innumerable militia. The English were received here at present as friends, and had he been a Pasha he could not have been sent forward in greater state than that in which Yakoob Khan despatched him. He had endeavoured to impress the Governor with the importance of encouraging agriculture and trade, but he replied that it was necessary first to secure his own position. Captain Marsh then described his journey by way of Sabzawar and Farah to Kandahar, where, again, he had the most cordial reception. This was in December, and he proposed to go hence north to Cabul, notwithstanding the snow, which he learnt interrupted the route. But eventually the Governor told him that he could not be allowed to proceed as he had no permit, and that he was instructed to see him clear of the city on the northward road to Quettah. He had, therefore, to proceed thither, and was received by the Governor of that place, which was in Beluchistan, with due honours. Here he saw a most interesting picture of patriarchal life. The Bolan Pass, leading to Jakobabad in Hindustan, had then been closed for three months on account of the tribes being at war, but, thank God, he and his guide passed through in safety. The pass, he said, was 80 miles long, and could easily be defended. Major Harrison, the British agent to the Khan of Khelat, was encamped here, and a most interesting meeting took place. Thence to Jakobabad was plain sailing, and he reported himself there on January 5th, quite well.

Sir JAMES ALEXANDER proposed a vote of thanks to the gallant captain; and, in seconding the motion, Lord HOUGHTON remarked that the geographical information furnished by Captain Marsh was increased in importance by the political situation, which rendered every contribution as to the nature of the country he had passed over, and its people, very acceptable. They must all acknowledge that they could not have a more valorous or enterprising pioneer than Captain Marsh.

Beluchistan.

Mr. E. A. Floyer (Indian Civil Service) read a paper on a "Journey in Beluchistan." This journey was made rapidly, but with care, in 1875-76, and the writer had also resided on the coast for some nine years. He gave a careful description of the southern portion of the country, its natives, and their manners and customs, together with a sketch of the history of the country and its chief products. This paper was the more valuable, as it furnished information respecting some portions of country never before trodden by a European, Mr. Floyer having taken a line between the routes of Captain Grant and Sir Henry Goldsmith. The lecturer enlivened his topic by some droll specimens of the folk-lore of the natives—for the most part a nomadic race, and possessing no written language. It had a strong affinity, he said, to the fables of Æsop.

Site of Mount Sinai.

Major-General Sir J. E. Alexander, C.B., read a paper "On the Supposed True Site of Mount Sinai." In the spring of 1875 he was in the East in connection with his favourite project for the removal of the Alexandria obelisk, popularly known as Cleopatra's Needle, to this country, he having learnt that it was sought to be destroyed by a contractor for the sake of building materials. He visited the Holy Land and the desert of Sinai, and here fell in with Mr. Beavis, the painter, who, like Holman Hunt and others, sought to represent the people of the East in their true costumes and with natural accessories. Mr. Beavis had just finished a picture of what he held to be the true site of the delivery of the law, namely, Jebel or Ras Sufsafeh, in English "Willow Head." In front of this mountain there was ample accommodation for a greater encampment than that of the twelve tribes, whereas the site fixed on by Dean Stanley and others, Jebel Musa—the mountain of Moses—had no such plain in its vicinity. Cook's *Commentary* supported the views of the lecturer in favour of Jebel Sufsafeh, although the latter peak was inferior in height to that of Jebel Musa, the latter being 9,000 feet above sea level. The mountain had a bare and rugged summit; its flanks appeared upheaved by subterraneous fires, and its aspect was very majestic. The colour of the mountain was a reddish granite. At the conclusion of his paper Sir James again referred to the removal of the obelisk, which he hoped to see safely in England by the month of October, and especially praised the liberality of Mr. Erasmus Wilson, the well-known London surgeon, who had himself given 10,000*l.*, the cost of its removal. McKillop Pasha had rendered him valuable service in dealing with the Egyptian authorities.

Mr. Hartshorn, in reference to the identity of Mount Sinai, pointed out the valuable aid which might be obtained from local tradition, but it did not appear that Sir James had been able to gather any information on this point.

The Chairman said they must thank Sir James very heartily for the public spirit he had displayed in rescuing the obelisk of Alexandria from the hands of the spoliator.

The Brahmaputra.

Colonel Godwin-Austen read a paper "On the Course of the Brahmaputra, or Sanpu." The author's argument, founded on researches and surveys in Assam, was that the true outlet of this great river was by the Sukushiri, and not, as was generally supposed, by the Deipong.

Mr. Trelawney Saunders ventured to differ by holding the conservative view of the subject, which, he suggested, would be a very proper one to bring under the notice of the Secretary for India. Here was one of the greatest rivers in the world, on our own frontier, still unknown to us, and it must remain so until a Government expedition or a private explorer met the question on the ground. The usual vote of thanks was accorded, and the section adjourned.

Monday, August 20th.

African Exploration.

Vice-Admiral Sir Erasmus Ommanney, K.C.B., again presided.

Commander Cameron read a paper on "Proposed Stations in Central Africa as bases for future exploration," by reviewing the remarkable journey of Dr. Livingstone on the Zambesi, and other travels which had opened up the country during the past twenty years. In this matter the old and new worlds might well shake hands, for Stanley's daring journeys were well worthy of those of old-world travellers. Much still remained to be done, and a step was taken last year by the King of the Belgians in starting an international association for the exploration of Central and South Africa, but eventually this great association broke up, and it was found better to form an entirely British organization which might work independently, but in friendly relation to other efforts. The committee had selected routes starting from the east coast as a basis of exploration. His opinion was that it would be better to establish a direct line of stations to explore certain districts, not only for the purpose of map-making, but for the extension of trade and commerce, and the general influences of civilisation. In appointing persons to the command of these stations it would be necessary to exercise great care, as they must be invested with magisterial power. At present the natives showed great inclination to gather for protection around any settlement formed by merchants or slave-traders, who granted them immunity from their warlike neighbours, in order to obtain necessary supplies. If, instead of the capricious rule of the slave-trader, the judicious rule of a British agent were established, they would soon find thousands of natives settling round, and as their numbers increased greater care would have to be exercised in dealing with them. It was doubtful whether our Government would give their authority to such a system as this, and, if they should decline to do so, the next best thing would be to place the agencies under the sanction of the Sultan of Zanzibar. In proportion to the work done, the excessive cost of travelling in Central Africa was more apparent than real, whilst the country possessed enormous natural wealth at present almost entirely undeveloped. The india-rubber trade was comparatively new. In the year 1875 the exports were worth 40,000*l.*, in 1876 they rose to 100,000*l.*, while this year they were estimated at nearly a quarter of a million. The rise in this important trade was entirely due to the enlightened efforts of his Highness Seyyid Burghash in suppressing the slave traffic in his dominions, the capital formerly used in the slave trade being now employed in this more legitimate commerce. Among the other resources of the country were Indian corn and various other grains, the export of which might form a most important food supply for the population of India. Considering the famines in that country, it behoved us to open up such an important resource—the products of Central Africa being vastly in excess of the native requirements. This would be a true solution of the over-population question. Apart from this great social question, it seemed that the continent of Africa had been purposely kept until this time in its present condition in order to supply the growing wants of the nineteenth and twentieth centuries. He believed the establishment of one or more great corporations, somewhat on the basis of the Honourable East India Company, although apparently the day for such great enterprises was past—the spirit of the age was against the granting of exclusive powers to such bodies—would be the most efficacious means of bringing the centre of Africa under the influences of trade and civilisation. If from any cause the proposed stations could not be fixed, he would propose the opening up of a certain district, which, having been thoroughly explored, missionaries, traders, &c., would soon occupy, and thus form a basis for further exploration and settlement. All petty jealousies must, however, be put aside, or the prestige of the white man would be damaged. If the proposed stations were established they should be utilised as centres for meteorological and other scientific observations. The more rapidly the centre of Africa was opened up, the more rapidly would the disgraceful traffic in human flesh and blood be abolished. To the English this should be a work of especial importance. Devon and the West country were justly proud of the veterans and explorers of olden times, the Raleighs, Grenvilles, and others; but it could not be forgotten that there had been one who had sullied the British flag by introducing the slave trade, and that trade we, as Britains, were, therefore, indirectly responsible for. Thanks were due to the Khedive and the Sultan of Zanzibar, and also to Dr. Kirk, his most able adviser, for the efforts which had been made to put a stop to the traffic in the east of Africa, especially when it was remembered that the Sultan of Zanzibar was acting against a strong opposition on the part of members of his own family, and other persons of influence with him. The systematic exploration of Africa was a subject which now interested the whole world; little Belgium, readily responding to her ruler's call, had subscribed 12,000*l.* for sending out an expedition. Portugal had sent out an expedition at a cost of 20,000*l.*, and other countries were giving attention to the matter. If we did not take care we should have the fruits of our own efforts taken from us by more enterprising neighbours. In this country, where all the finances of the Government had to be submitted to the House of Commons, we could not expect the Government to act so liberally as those of other nations, but this should stimulate us as individuals to greater efforts to forward the scheme for the exploration of Africa.

Dr. Beddoes had listened with the greatest satisfaction to the tribute of Commander Cameron to the enlightened policy of the Sultan of Zanzibar, under the able guidance of Dr. Kirk. He asked for further information as to suitable localities for the formation of stations or the districts in which the stations might be formed.

Sir James Watson, after a flattering reference to the gallant journey of Commander Cameron, and to the lucid explanation which he had given of his proceedings, said he considered the opening up of Central Africa the great problem of the age. Captain Young, of the Free Church Missionary Society, had gone up the Zambesi to the Victoria Falls, and afterwards proceeded to Lake Nyassa, and there the Free Church had formed a mission which would be useful as a starting-point for future explorers. These missionaries were anxious for the establishment of a route from Zanzibar to the north end of Lake Nyassa, which would throw open a most important district to trade and commerce. The Scotch Committee were only awaiting the formation of a London company for the development of Africa to afford it an auxiliary. There were good harbours on the coast near Zanzibar by which they might proceed to the interior without paying the heavy toll which the Portuguese levied on all goods sent up the country from the southward.

Mr. Kerry Nicholls thought there could be no doubt that, if the scheme advocated by the Exploration Committee were carried out, the work would be systematically and thoroughly done. An area of 800,000 statute square miles, or over six times the size of the United Kingdom, lay open for settlement. The central plateau had an elevation of over 4000 feet above the level of the sea, and it must be clear that the Geographical Society's scheme deserved universal support. He referred to the carrying of the land line of telegraph across the interior of Australia, and other daring exploits in the construction of routes over hitherto unexplored countries, and said that Khartoum, which has already telegraphic communication with Egypt, might be a base of operations whence a line of telegraph might be connected with the Zambesi, a distance of 2600 miles, only 600 longer than the line traversing the Australian continent. It was interesting to remember that they were now in the town which had formed the great Plymouth company for the settlement of Virginia, and that from the harbour in front of that town the Pilgrim Fathers sailed to found one of the greatest nations in the world. From the same Sound, too, Captain Cook started to prosecute those scientific explorations in the South Pacific which had resulted in the formation of our noble colonies in those regions. It was impossible to say that the work now proposed might not open to us a territory which would add to our prestige the glory of a second empire like that of British India

Mr. Trelawney Saunders complained that in this matter, unlike their daring forefathers, the merchants of the present day were all asleep, and the missionaries were the only persons to follow up the work the geographers had commenced. The African trade of Rome and Carthage and Egypt had been extinguished by the Arab invasion, and all traces of ancient civilisation were swept away. This remained so until the explorers of this and other countries commenced their work; and already great results were achieved. It was clear, however, that somebody must be responsible for the conduct of traders and explorers, for we could not allow filibustering expeditions to shoot down the natives indiscriminately, as on a recent occasion was the case. He contended that only through the instrumentality of properly organised associations we could hope to bring the vast continent of Africa under the influence of trade and civilisation. But at present it would be useless to talk of telegraphs and other works.

Mr. Nicholls explained that he only referred to the telegraph as it was mentioned in the circular of the Geographical Society. If we were to go into Africa at all, it must be in a way in which we could benefit the natives, and great engineering works were necessary for the development of trade and commerce.

Professor Tennant was anxious to say a few words with reference to recent diamond discoveries in South Africa. It might not be generally known that in this neighbourhood one of the finest collections of diamonds in England had been shut up for nearly fifty years. When he visited Plymouth with the British Association in 1841, he had great difficulty in finding this collection, which was one formed by Sir John St. Aubyn, and given to the Devonport institution. The police had the keys of the collection, and only allowed the public to inspect it on Saturdays. It was impossible to tell these diamonds from Cape diamonds, and he contended that the latter were, in respect of value, quite equal to other diamonds, although in some quarters they had been greatly disparaged. Within ten years, diamonds to the value of sixteen millions had been sent to this country; they were pure carbon, and of crystalline form. He mentioned the views of Dr. Atherstone, to whom the first specimens were submitted, he being a resident in the colony, and remarked that Dr. Atherstone was a strong advocate of telegraph communication through Africa. A large amount of gold had been found in the recently-annexed district of the Transvaal, and there was no reason why the country further north, to which their attention was now called, should not be equally productive of mineral wealth.

Mr. F. E. Fox, of Plymouth, pointed out the very important service which might be rendered if it were possible to introduce on the main routes a cheap railway system, to throw open the country to trade and commerce. He would ask if any engineers present could suggest anything of this kind.

Mr. F. W. Fox, of Bristol, described a system of railway which could be constructed at one-half the ordinary cost, say 500 miles, for three-quarters of a million. Commander Cameron had estimated it at only half a million. It would be difficult, however, to find any one prepared to run it; but there need be no difficulty provided a nucleus were formed. He hoped the day would not be far distant when Commander Cameron would be appointed as British Consul to open up the trade of Africa.

Sir James Watson wished to know whether any serious opposition was likely to be offered by the petty native chiefs.

Sir James Alexander mentioned that in 1837 he was employed by the Royal Geographical Society and the Colonial Office to explore portions of Southern Africa. He found copper on the Orange River, and brought the first specimens of Cape copper to this country. He would be glad to know in what condition the mines at present were, as the companies had since declined to recognise him in any way as the discoverer of the metal.

Admiral Nolloth said, from his experience, he believed that the difficulty of copper mining in South Africa consisted in getting ships of sufficiently small draught to go up the rivers.

Mr. Francis Galton, as an explorer after Sir James Alexander, said it was quite correct that the whole country was full of copper ore, but the cost of transport was very considerable. In regard to routes, a wagon road had been made from Zanzibar to M'papwa, and here the dreaded tsetse fly did not exist, although it abounded in the country to the south, and would therefore prevent oxen and horses being driven there. The Geographical Committee proposed to work between the Zambesi and the Victoria Nyanza, and it was a difficult question to answer as to what these districts could furnish to the civilised world. Still, we ought to take stock of our estates in all parts of the world, and there could be no doubt that as the products of this district were brought out, new industries would arise for their utilisation.

Dr. Lindeman, of Bremen, assured the meeting that Germany took great interest in the English exploration of Africa. He mentioned the names of several German explorers who had worked on the Congo.

Commander Cameron, replying upon the discussion, remarked that the extension of the telegraph into Africa was one of the great ideas of the age, but the wild African elephants, which roamed the country in herds, would be a great danger to the poles, which they would probably take to be a new kind of tree. In addition to subsidising the native tribes, we should have to subsidise the elephants. He considered a more feasible plan would be the laying of a cable from Aden down the East Coast of Africa, having stations at Zanzibar, Mozambique, and other points. In regard to the pioneer railway, the idea was that the whole traction power should be done by horizontal friction. No great cuttings or embankments would be necessary. The scheme was being considered by a Glasgow engineer. In regard to routes, he believed Lake Nyassa to be nearly in the same line as Lake Tanganyika. By establishing stations at the end of the lakes, and steamers upon them, they would have a most important water-way. To get into the Congo system it would be necessary to proceed to the Bangweolo, and turn to the northward to Nyangwe and Lake Sankorra, and thence down the unexplored portions of the Congo. Nyangwe was at present a native trading station, and would be important for a settlement. Another should be on Lake Sankorra. The capital of Muata Yanvo's country would be an important post, as also would be Katongo. Gold was found at Katongo in large quantities, but the natives preferred "the 'red copper' to the 'white copper.'" A route by the Dana River and the Victoria Nyanza would afford M'tesa an opportunity of holding his own against the attempted annexation of Egypt. In everything but length the Nile was a mere gutter to the Congo, at the mouth of which the depth was a thousand fathoms. The distance hence to Nyangwe was only 800 miles, and a fine service of steamers could be established. The stories of the murders in the Congo by Portuguese, and, he regretted to say, an Englishman too, which we had recently received, showed the importance of this district being taken charge of for the sake of civilisation.

The President congratulated the meeting on the discussion which had taken place, and regretted the absence from it of Sir Rutherford Alcock, who was at the head of the Exploration Committee. He believed the death of Livingstone had aroused an interest in Africa, and that we should now thoroughly explore it. He could not sit down without, as a naval officer, again expressing his pride at the gallant conduct of his brother officer (Commander Cameron), who, it must be remembered, had accomplished his great task without shedding a drop of blood. He proposed a vote of thanks to Commander Cameron for his valuable paper.

Sir James Watson, in seconding, expressed the hope that Plymouth would not be behind Glasgow in forwarding the great undertaking which they had in view.

East Africa.

Mr. H. W. Bates, one of the Secretaries, subsequently read a paper by Dr. J. Kirk, "On a Visit to the Mungao District, East Africa." The writer described the former desolation of the country by the slave trade. This traffic, however, had now been put a stop to, and as the coast possessed several splendid harbours, it might afford a good commencement of the route to the Nyassa. The only obstacle was the prevalence, in some of the best districts, of the tsetse fly. He would prefer M'linde, as free from this plague. An important trade in copal, of which large forests had been discovered here, had sprung up since the abolition of the slave trade.

Mr. E. C. Rye read the last paper, by Mr. F. Holmwood, "On the Kingani River, East Africa." In the exploration of this stream the writer had had a large share. The entrance to the Kingani was somewhat difficult. The banks were generally low, and the adjacent country was a vast plain. The upper reaches of the river were greatly impeded by long grass, sunken timber, and stones. The region continued damp and unhealthy, owing to want of natural drainage, for a long time after the rains had ceased. His belief was that as a navigable river the Kingani was practically useless. He would prefer the route by the Saadani road, although he looked on Mombasa as the future depôt of Central African trade. The mouth of the Wami could be readily improved, and would, he believed, be made fairly navigable for at least 40 miles. He would strongly recommend the route he referred to through Useguka being tried as the road to Unyanyembe and Ujiji.

Wednesday, August 21st.

Admiral Sir Erasmus Ommanney in the chair.

The proceedings opened with a paper by Dr. J. S. Phene, LL.D., describing a recent tour through unfrequented parts of Greece. Many of the places named he had visited at the risk of his life, and all of them at great pecuniary cost. He saw the temples of Bassa and Phygalea, points hardly ever visited even by fishermen. Here he found, amongst other notable objects, a prehistoric temple. He made a special effort to visit the northern islands on the coast of Thrace, and on one of the mountains—the difficult one of Samothrace—

found a magnificent cyclopean fortress, not mentioned by previous travellers in that region. The walls extended from the sea nearly half a mile up the mountain, and the style of the building was quite as rude as that of Tyros, and clearly later than Mycenæ. The island had a dangerous coast and hardly any anchorage, and it was, therefore, seldom visited.

Two other papers were read in this section by the secretaries, one contributed by Mr. Alfred Simson, describing a journey from Guayaquil to the Napo, by the Upper Pastasa route, and another, by the same writer, giving the results of the journey up the River Putumayo, South America, which resulted in settling the question, the object of the journey, as to whether the river is navigable by steamers. Mr. Simson found it to be so. A discussion followed this paper, which concluded the programme of the section.

PARIS GEOGRAPHICAL SOCIETY.

May 16th, 1877.—M. Levasseur in the chair. Dr. J. Trevaux reported that he had made an eleven days' journey on the River Kurn, in French Guiana, in a small war steamer, engaged in surveying duties. He furnished several botanical notes of interest. M. Paquier read a paper on Central Asia, a subject to which he has devoted special attention.

June 6th, 1877.—M. Levasseur in the chair. M. de Lesseps introduced Major de Serpa Pinto and Captain Brito Capello, the officers of the Portuguese African Expedition. M. Lucien-Napoleon Wyse read a paper on the exploration of the Isthmus of Darien, with a view of constructing an oceanic canal through it. M. Delesse gave an account of Dr. Hayden's explorations in the Western States of North America.

June 20th, 1877.—M. Levasseur in the chair. M. Largeau writes from Wargla to say, that, owing to the disturbed state of the country to the south, he had determined to put off his departure for the interior of Africa till the 1st of October.

July 18th, 1877.—M. Levasseur in the chair. M. C. Wiener wrote to say that he, with two companions, had made an ascent of the peak in the Bolivian Andes, S.E. of Illimani, and named it *Pic de Paris*. Its height, as determined by boiling point thermometer and aneroid, was 20,112 feet, its latitude 16° 33′ 10″ S., and longitude 70° 6′ 21″ West of Paris. Captain Perrier sent a report to the Society on the operations for the determination of longitude between Paris, Neuchâtel, Lyons, and Geneva.

PARIS SOCIETY OF COMMERCIAL GEOGRAPHY.

May 25th, 1877.—Messrs. Jules Garnier and Meurand presiding. The Committee appointed to report on the feasibility of an exhibition of African products in 1878, recommend that this project should be made to include all other countries as well, and that an application for a subvention should be made to the Government. General Robin read a paper on Chinese emigration, and M. H. Capitaine on the acclimatization of the *faham*, or *epidendrum ovatum*, an orchid well adapted for substitution for the tea plant.

July 18th, 1877.—M. Hertz in the chair. M. Capitaine read a paper of M. l'Abbé Robert, on the employment of negro labour in Algeria, in which the Abbé expressed his belief that such an experiment could not be attended with success. The President insisted that civilised countries should do their best to reclaim the negro, while M. Capitaine was of opinion that a superior and an inferior race could never properly fuse and amalgamate, and that the eventual extinction of the latter was only a question of time.

LYONS GEOGRAPHICAL SOCIETY.

April 19th, 1877.—M. Louis Desgrand, President, in the chair. The election of the officers of the Society for the current year took place.

M. Paul Soleillet read a paper on his journey to In-Salah, which was illustrated by a map of that part of the Sahara, compiled by M. Duveyrier.

In reply to a proposal of the Lyons Society, that, with a view to a better diffusion of geographical knowledge, all nations should agree to mark their postage stamps with the name of the state and province whence they are issued, the Geographical Society of Hamburg approves of the notion, but declines to take the responsibility of urging it on the Berlin authorities.

M. Schwich read a paper on recent discoveries of Italian travellers, touching upon those of D'Albertis and Beccari in New Guinea, and upon the Italian expedition to Shoa, in equatorial Africa, to join which Captain Martini had recently set out from Italy.

May 17th, 1877.—M. Largeau sent some interesting particulars respecting the formation of artificial oases in the Sahara by means of artesian wells, under the superintendence of Lieut. Lille, and on the process of the natural formation of dunes.

Dr. Gay read a paper on Brazil, which is to be published in the forthcoming number of the *Bulletin*.

July 19th, 1877.—M. Largeau sent particulars of an excursion he had made in the neighbourhood of Wargla, and of the ruins of a town called Chedrata, which was destroyed at the time of the Muhammadan invasion, and the ruins of which, like others in the Sahara, denote a high state of prosperity in former times.

Two committee meetings have already been held in connection with the approaching congress of Orientalists, to be held at Lyons in 1878, and preliminary arrangements have been made.

Colonel Champanhet read a paper on Captain Roudaire's levelling operations in Tunis and Algiers, and, at the conclusion of it, expressed a doubt as to whether it was politic to undertake in Tunis an undertaking which would only benefit Algiers in part, while the proposed railway from Algiers to the Niger, and to Senegal, by way of Timbuctoo, would be constructed in a shorter time than the inland sea, and would prove much more profitable. This paper elicited a lively discussion, which was adjourned to the following meeting.

RUSSIAN GEOGRAPHICAL SOCIETY.

Meeting of the 4th (16th) May, 1877.

M. Sreznevsky, the Secretary, read the usual monthly report. He detailed the preparations made for the expedition to the Angara and the water-parting of the Ob and Yenisei. Owing to the necessity of examining all existing information respecting the Angara, this part of the programme has been deferred till 1878, and the Committee have devoted themselves to the exclusive consideration of the scheme for uniting the systems of the Ob and Yenisei. All the projects which have ever been started towards this end, from the time of Colonel Ridder (1800) till the Expedition of Captain Sidensner in 1876, have been considered, and two routes have been selected as offering particular facilities—that by way of the Keti, Lomovat, Yazef, and the Little and Great Kass; and the other, more to the south, by way of the Keti, Sochur, Pestchanka, and Chulesma. The first of these routes discovered by Funtussof in 1873, has already been examined in detail by Captain Sidensner's Expedition; the second is only vaguely known. The new expedition will this summer examine both routes and pronounce which promises best.

Mr. Smirnof, Professor at Kazan University, proposes to undertake a seventh and last journey through Russia this summer for the purpose of completing a series of magnetic observations extending over the whole of the Empire. He will ascend the Volga as far as Yaroslav, and thence journey to Arkhangel by way of Vologda; on his return he will journey by Onega and Kargopol to St. Petersburg. M. Raiefsky, who is bringing out a work on the production and trade of wheat, has arranged to go to Riga to make researches on the trade of that port in grain and textiles.

The first volume of the results of the Amu-Daria Expedition, containing meteorological observations made at Nukus and Petro-Alexandrovsk has been published.

Announcement was made that the National Committee for the Exploration of Africa had held its first meeting on the 19th of April, under the presidency of the Grand-Duke Constantine Nicolaivitch. Russia would be represented at the June Conference, in Brussels, by Messrs. P. de Semenof, Baron Osten Sacken, and Dr. Schweinfurth.

Dr. PIASSETSKY gave an account of the return of the recent Scientific and Commercial Expedition through China and Mongolia in 1875. He also exhibited a very large water-colour panorama, which he had painted day by day, depicting the country traversed.

——:o:——

VIENNA GEOGRAPHICAL SOCIETY.

April 24th, 1877.—Dr. F. VON HOCHSTETTER, President, in the chair. The President drew attention to the value of the explorations made by Messrs. Forrest, of Perth (Australia), and Ernest Giles, of Melbourne, and announced that these gentlemen had been elected honorary members of the Society. Announcement was also made that His Imperial Majesty the Emperor, three of the Crown Princes, and the Minister of Education had all agreed to subscribe annually towards the funds of the Society, the subscriptions amounting in the aggregate to 1230 florins. The President made favourable mention of a map of the world compiled on the scale of 1:112,500,000 by Herr Broditzky, and showing, in a remarkably clear manner, the lines of steamboat traffic, and of marine and overland telegraphs, as completed up to the end of 1876. The length of the voyages between different ports is given, and the nationality of each steamboat company. Notice was made of two reports by Herr von Weigelsperg (i) on Technical Education in Belgium, illustrated by a statistical map showing the distribution of technical schools throughout the kingdom, and (ii) on the same class of educational establishments in Prussia, Saxony, Bavaria, and Wurtemburg.

Dr. F. SIMONY then read a paper on certain photographic views taken by him in the Austrian Alps.

May 22nd.—Vice-President V. HELFER in the chair. Hofrath von Becker read a paper on "Istria as a Field of Research and Development of Culture."

——:o:——

ITALIAN GEOGRAPHICAL SOCIETY.

June 11th, 1877.—The usual monthly conference took place at midday, the President, Signor Correnti, conducting the meeting, which was attended by a numerous and select audience.

Prof. BELLUCCI was the first to speak. He was one of the members of the Commission sent by the Geographical Society to study the Gabes region, as to the greater or less possibility of introducing the waters of the Mediterranean into the Algerine and Tunisian Schotts. Prof. Bellucci explained the results obtained by Captain Roudaire, by the Italian Commissioners, by the Engineer, M. Fuchs, and Stake, the Geologist. He mentioned the original starting-points of the project presented in 1874 by Captain Roudaire; the studies completed by this gentleman in 1875 and 1876; and the results of the geometrical levels taken in the vicinity of the Schott *Mel Rir*, and across the district that runs from the so-called Isthmus of Gabes to the above-named Schott. He stated the great modification that the primitive project had to undergo in consequence of these researches, and how the possibility of its success was thereby rendered out of the question. The region occupied by the Algerine and Tunisian low-lying lands, even were the very vague suppositions of Roudaire with regard to the subterranean lake of the El-Gier-id Schott verified, would not be concentrated in one single basin, but in three distinct basins, separated by canals, of the respective length of 10 kilometres and 80 kilometres. The Professor then demonstrated the chief objections that have been and are yet raised against the said project—objections founded on the observations that the Italian Commission had the opportunity of making in the Gabes region, and on those instituted in the same spot by Fuchs, Stake, and others. He concluded by remarking that, both from the report presented by Captain Roudaire, and from the representations made respecting this report, by a Committee of the French Academy of Science, the necessity of further and deeper investigations became obvious, chiefly with regard to the new direction given to the primitive project of Captain Roudaire.

Signor BRUNIALTI next spoke on the subject of the economical reasons that were in opposition to this plan, fully recognising, nevertheless, the necessity that existed for some new means of approaching Central Africa. This led him to mention two projected railways, one of which the French were desirous of constructing between one of the Algerian ports and Timbuctoo, and another which M. Rohlfs, following up, possibly unconsciously, the ideas of our fellow-countryman, Signor Paladini, wished to make between Tripoli and Kuka on the Sciad Lake. Signor Brunialti described the two different lines proposed and their mutual advantages, namely, the placing in immediate connection with Europe the wealthy regions of Central Africa.

He entered upon the objections raised with regard to the ferocious inhabitants, to the scarcity of water, and the want of wood and coal. Comparing the two plans of railway, he showed that that of M. Rohlfs was by far the more eligible for our commercial interests, and said that it was his hope that Italy would join Germany in making the preliminary studies on this line, which would open up Central Africa to civilisation, commerce, and geographical science.

Signor GUARNASCHELLO PAGANO then spoke at considerable length on the subject of the geological and orohydrographic conditions of Sicily.

NOTICE.

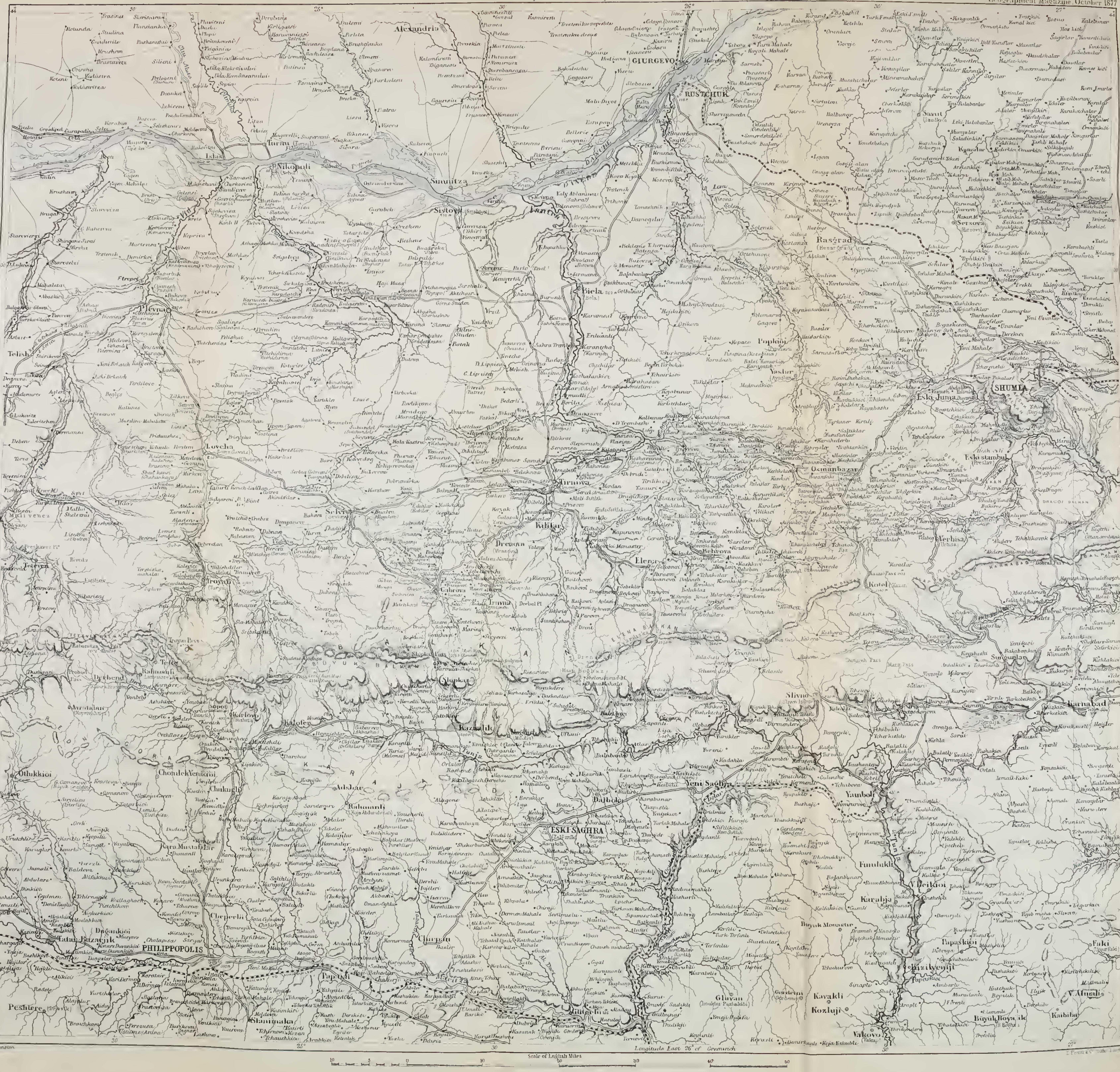
The Office of THE GEOGRAPHICAL MAGAZINE *is at* 57 *&* 59, *Ludgate Hill, E.C.*

Annual Subscription and Postage, £1, Inland. Foreign Orders must be accompanied by P.O.O. or Cheques to include the full amount of Foreign Postage. Post Office Orders to be made payable to Messrs. Trübner & Co., 57 *&* 59, *Ludgate Hill, London, E.C.*

A MAP OF THE SEAT OF WAR IN EUROPEAN TURKEY.

Chiefly from the Austrian Map

Geographical Magazine, October 1877



THE
GEOGRAPHICAL MAGAZINE.

OCTOBER, 1877.

THE SEAT OF WAR.

THE accompanying Map of the Seat of War covers the ground which is likely to be the chief centre of interest during the present autumn, and perhaps throughout the winter. It includes the whole of the wedge-shaped region to the south of the Danube, now occupied by the Russian army. If the Czarewitch succeeds in maintaining his position in front of Biela, and along the line of the River Jantra, the country which will probably be occupied during the winter can already be defined. It is of triangular form, with the Danube as its base from the mouth of the Osma at Nicopolis to the mouth of the Jantra 20 miles below Sistova. The two sides are formed by the Rivers Osma and Jantra. The former, rising in the Balkans between Slatitza and Shipka, flows north to Lovatz, then takes a wide sweep to the eastward, finally turning north-west, and falling into the Danube at Nicopolis, after a course of 70 miles. To the westward, in the valley of the Vid, is the strongly-entrenched position of Plevna, still held by the Turks. The river Jantra, the eastern side of the triangle, rises in the Shipka Pass, flows northwards past Gabrova and Tirnova, the ancient Bulgarian capital, to Biela, and thence, taking a sharp turn to north-west, continues on that bearing to the Danube. To the eastward of the Jantra are the valleys of the Black and White Lom, with Ruschuk at the mouth of their united stream, and Rasgrad on the banks of the White Lom. Shumla is within the basin of the river flowing into the Black Sea at Varna; and this eastern portion of Bulgaria, from the Jantra to the sea, is occupied by the largest of the Turkish armies, commanded by a renegade German. Thus the Russian position is in the form of a wedge driven into the heart of Bulgaria, with its apex in the Balkan mountains. It cuts the Turkish forces in half, the larger army being to the east of the Jantra, and the smaller to the westward of the Osma, in the extemporised fortress of Plevna. A third Turkish army threatens the apex of the triangle in the famous Shipka gorge: and it is here that the most heroic deeds as yet recorded have been performed by the Russian defenders of the pass.

The chain of the Balkans is not connected with the Illyrian Alps, but is a distinct system, extending from the valley of the Timok which separates Servia from Bulgaria, to the Black Sea. The Balkans thus form a vast and elevated plateau, sloping gently down towards the Lower Danube, but with an abrupt descent to the south. From the Black Sea to Slivno the steep southern slopes are composed of cretaceous rocks, intersected by porphyries. To the west of Slivno these slopes are of granite and gneiss, while between Shipka and Slatitza mica-schists and clay slate predominate. The western portion of the range, bounding the basin of Sofia on the north, consists entirely of Triassic sandstone and limestone. In the copy of Hochstetter's Geological Map of Eastern Turkey, given in our number for November 1873 (facing page 328), there is a section of the Balkans a little to the eastward of Shipka, showing the lofty summit immediately above the convent of Mikhlis, and another from Trevna to Eski Zagra. A third and most instructive section, on the same map, is from Nicopolis, on the Danube, by Plevna, and across the Balkan range at the Isker defile, to the basin of Sofia. Here are shown the pliocene diluvium of the valley of the Danube, the miocene deposits of the Osma and the Vid, the upper chalk and galt, the capotrina limestone of the bases, and the Neocomian limestone of the summits, in that part of the Balkan range.

The Shipka region of the Balkan is within the crystalline zone. The strata are much contorted, and dip generally 80° south, containing many quartz reefs; and near Kasanlik granite and gneiss are found. The Shipka Pass is almost in the centre of the Balkans, half-way between the valley of the Timok and the Black Sea. From the north it is approached by following the river Jantra to Gabrova, a town inhabited by industrious Bulgarians, and consisting of about 1300 houses. Thence the road ascends, through a magnificent forest, to the actual pass, which is 4324 feet above the level of the sea. Then the first view is obtained of the plain to the south, the famous "Valley of Roses" of Kazanlik. The steep slopes and profound valleys are streaked here and there with forests of oak and beech. The route descends from the pass very rapidly, and, while the road from Gabrova to the summit is reckoned at 4½ leagues, the village of Shipka is reached in an hour after leaving the highest point. Shipka is a village with about 800 Bulgarian houses and two churches, and is situated in a gorge bordered by forests. Another hour is sufficient to reach Haskioï, in the plain, and another brings the traveller, through walnut groves and rose gardens, to Kazanlik, a town with 21,000 inhabitants.

The Shipka Pass is the apex of the triangle occupied by the Russian army; and its gorge, as well as the whole area now forming the seat of war, is full of memories of former struggles of the unhappy people against their Turkish invaders. More than 500 years ago the Turks, under Murad I., overran Roumelia to the foot of the Balkans; and their sanguinary leader made Adrianople his capital in 1362. But for nearly a century the inhabitants of the country, the Servians and Bulgarians, continued a desperate and heroic struggle against the ferocious invaders. The crushing defeat at Kassowa in 1390, when Murad was killed in the moment of victory, did not end the contest, although it probably made it desperate for the time. The struggle has continued, at intervals, until this day, and the Turks are now, as they were then, a horde of invaders and nothing more. It was in the Shipka Pass that Marko, the national hero of the southern Slavs, long defended his country against the Turks; and the patriotic struggle was not without gleams of hope. John Hunyad on one occasion defeated the invaders, and advanced as far as Sofia. On another he penetrated into the heart of the Balkans in the dead of winter. The chivalry of the west came to the aid of the patriots; and "hope for a season bade the world farewell" when the ferocious Bayazid routed the Christians at Nicopolis in 1444, and massacred a hecatomb of prisoners. But only for a season. The ruthless invaders have fixed their deadly grip on their victims for more than five centuries, and for that time the whole Balkan peninsula has been overrun, and its inhabitants ground to the dust, except in one favoured spot. Montenegro has remained unconquered, and is unconquered still.

The parallel is, in many respects, very striking between the struggle of the Spaniards against their Arab conquerers, and that of Servians and Bulgarians against the Turks. In Spain, when the flood of invasion covered all the land, one spot remained free, and the little Gothic kingdom of Asturias was never subdued. So in the Balkan Peninsula ruin spread over the whole land, except among the recesses of "unconquered Tsernagora." As in the Iberian Peninsula the people gradually formed the independent kingdoms of Portugal, Aragon, and Navarre; so in the Balkan Peninsula the men of Roumania, Servia, and Greece have, one by one, after most heroic struggles, escaped from the blighting grip of the invaders. At last, after 500 years, St. Ferdinand conquered Seville, and the Arabs were confined in the small district of Granada until the end came. Broussa should soon be the Turkish Granada; for the 500 years of desolation and ruin in the Balkan Peninsula, dating from the battle of Kassowa, is within thirteen years of its completion.

There is, however, one fatal difference between the two cases. The Spaniards, as regards the means of offence and defence, were in those days almost on an equality with their invaders. But the invention of arms of precision has made a successful war for freedom, without foreign aid, an impossibility to the half-armed and unarmed people of the Balkan Peninsula. The Turks were always famous for their obstinate valour in the defence of fortified positions; and they have now shown that they are equally formidable in the field, when excited by fanaticism and hate. Against armies of such men, supplied with all the most improved weapons of modern warfare, there could be no hope for their victims. A life of degradation and oppression, with the prospect of hideous massacres at every sign of resistance, was before them and their children's children if no f[illegible]n aid should come.

Last year the indignation of all Europe was aroused against Turkish misrule. The Powers united in remonstrances and in demands which were not to be enforced. The Pashas were ready to institute mock parliaments—to make any promises of reform—as they always have been since the commencement of Turkish decadence. But they wisely refused to give any guarantee, because they knew that the performance of their promises was impossible. A conquering Turkish horde, of a different race and religion from the conquered, never has governed and never can govern. It can conquer, massacre, and extort payment of taxes; but it cannot, and never will, administer justice, nor perform the ordinary acts of government with any approach to efficiency. Alone among Turkish conquerors, Akbar was a good ruler in the European sense; but he had ceased to be a Muslim, and was only half a Turk. Where there is not, and never has been, efficient government, there can be no duty of allegiance, and no treason in resisting the invaders.

But there was no hope for the inhabitants of the Balkan Peninsula without foreign help. It was a just cause; and there was a time when the people of the west would have adopted it as their own. For this very cause the bravest knights of France and Flanders were massacred at Nicopolis. For it the gallant Boucicault encountered every form of peril; and for it the brave Enguerrand de Coucy, the flower of western chivalry, rotted in a Broussa dungeon. For the same cause Hastings and Church fought, and Byron died. It was to help an oppressed people to throw of the yoke of cruel invaders that Francis Vere bled at Nieuport, and Philip Sydney received his death wound at Zutphen. But these are not the days of Vere and Sydney, nor even of Hastings and Byron. The English will not interfere unless "British interests" are threatened. It is no longer a part of "British interests" to fight the good fight in which Sir Philip Sydney died and Frank Abney Hastings immortalised his name—the fight for freedom and against foreign oppression, the only cause in which war is justifiable. Help must come, if at all, from elsewhere.

It has come. The Russian people forced their Emperor into a contest, with the object of securing deliverance for the unfortunate races, who, for nearly five centuries, have groaned under the Turkish yoke. The struggle has proved more desperate, and even more doubtful than was anticipated. Admirably armed, actuated by the strongest motives of self-interest, and by desperate fanaticism, the Turkish invaders have displayed all the tenacious valour of their ancestors, and have already inflicted appalling losses on the Russians and on their native allies.

Still the work was well begun. The Turks are not a people, but merely an invading horde, not numbering more than 1,388,000 souls in Europe, including the Tatars of Tulcha, or about 350,000 fighting men; 300,000 not counting the Tatars. This is an army not a people, and it cannot be much more than doubled by the Turks of Anatolia. Time will tell against them, for recruiting from the same materials is not possible, and it is the Ottoman Turk who is the formidable soldier. On the other hand, the Russians have shown the same valour as of old, and they are recruited from a people numbering 80,000,000. They are in a friendly country, and have the active assistance of the Roumanian nation, numbering 4,000,000 souls. Their military position is central, cutting the Turkish forces in two; and the oversights and mistakes of an opening campaign will, it may reasonably be expected, be avoided as experience is gained.

The Russian and Bulgarian defence of the Shipka Pass is the chief glory of their first campaign. The Turkish army of Roumelia commenced the attack on the 21st of August, advancing directly against the scarped heights in front of the village of Shipka. The garrison of the pass then consisted of the Bulgarian legion and of a regiment of the 9th Russian division, both much weakened by previous hard fighting, and not counting more than 3000 men and 40 guns, without any succour nearer than Tirnova, a distance of 40 miles. After a desperate resistance behind their first line, they retired in good order in rear of Mount St. Nicholas, the loftiest part of the pass; with a loss of 200 men, chiefly of the Bulgarian legion. On the second day the Turkish attack was less animated, as they were engaged in making a flank movement to the right and left of the Russian position. On the third day the little band of heroes was attacked in front and on both flanks by 50,000 men, and their leader, Stoletof, conducted the defence with impetuous valour. At the most critical moment a brigade of the 9th Division, under General Dorojinsky, arrived from Selvi, and enabled the defenders to hold their ground, but with an overwhelming force of Turkish invaders attacking them, not only in their front, but also on both flanks. The two generals believed their destruction, and that of their gallant comrades, to be inevitable. They sent off a last message to the Czar, declaring that they would all defend the pass to the last drop of their blood. The soldiers were covered with dust, broiled by the sun, exhausted with the heat, fatigue, hunger and thirst. With the triumphant shouts of the assailing Turks on all sides ringing in their ears, the heroic little band still fought on. On a sudden Stoletof uttered a cry of joy. A long column could be seen winding up the ascent from Gabrova. The head of the column of succour approached Mount Karaula and deployed on the little plateau. It consisted of cavalry. Soon the infantry came up, and breaking into skirmishing order, began to climb the heights on the right. Then puffs of smoke were seen to rise from every rock and bush. It was a brigade of carbineers, under General Radetzky, who now attacked the Turks, without having halted for a moment after a march of 20 miles. While this advance was made over the heights, the main reinforcements marched direct to the entrenchments at the head of the pass, where Radetzky at once assumed the command. On the fourth day the Russians assailed the Turks threatening their flank, and they were helped by the people of the country, who carried water to refresh the combatants under a heavy fire. Later in the day, Dragomirof arrived with two more regiments; but it was found that the Turks were in great force in the woods on the left, commanding the road from Gabrova. Here the fighting was long contested. The brave Dragomirof was rendered *hors de combat* by a ball in his knee, but the defenders of the pass were successful; the Turks were driven back, and the position was freed from the danger which threatened its right flank. Then Radetzky led another attack in person, and drove the Turks from their last position at the point of the bayonet.

For twelve successive days the position of Radetzky was assaulted by the Muslim invaders, who made 104 distinct aggressive movements, and every time they were hurled back with heavy loss. The Russians held Mount St. Nicholas, the highest point of the pass, and the crests of two hills on either flank; while the Turks, in vastly superior numbers, had extended their lines down some flanking ridges, nearly to the Gabrova road (the only line of retreat), until they were dislodged by the succouring column led by Radetzky. Again, within the last few days, the Turks have made a desperate attack on Mount St. Nicholas, after a long cannonade, and again they have been hurled back with tremendous loss.

To the natives of the country, this heroic defence must be an omen of future success, and of the final expulsion of the invaders. For it was on this same spot that Marko, their national hero, made his brave stand against the Turks when they first overran the land in the fourteenth century. And here, once more, the long struggle is renewed, for the time successfully. While the apex of the triangle was thus valiantly defended, and a whole army of Turks was kept fully employed by a handful of Russians, it has been and will be the business of the main army, now reinforced by the Imperial Guards, to invest Plevna and defend the line of the Jantra. If they fail, the Danube must be re-crossed and the Shipka Pass must be abandoned, as well as the towns within the triangle. If successful, they will be in a position to advance to the completion of their work, and to exact that liberation of the people of the Balkan Peninsula, by force of arms, which was insolently refused when solicited by the united voices of England, Germany, Austria, France, Italy, and Russia. The sacrifice has been terrible; but the object is no less than the liberation of millions of people from a cruel and oppressive tyranny.

M. DUPUIS' EXPLORATION IN TONG-KIN AND YUNNAN.

M. J. Dupuis, the French traveller, known for his explorations in Tong-kin, and for his strenuous endeavours to open up in that direction a trade route from South-western China, has communicated to the Paris Geographical Society an account of his travels.

He had endeavoured in 1868-9, on the occasion of a visit to Yunnan, to enlist the co-operation of the mandarins, and in the latter part of 1870 he returned thither to prosecute his journey. On the 25th February 1871, M. Dupuis left Yunnan-sen in the company of his secretary, Wang, a literary mandarin, and embarked on the canal, which communicates with the adjoining lake, a beautiful sheet of water about 43 miles long, and from 14 to 17 miles in breadth. The mountains rise from the lake on the western side in the form of terraced cliffs, which, during the rainy season, are covered with scanty vegetation. The eastern side, on the other hand, is well cultivated and peopled. The outlet to the lake is on the western side, and, after turning abruptly northward, joins the Kinsha-kiang or great Yang-tse. After eight hours' navigation, Kwen-yang was reached, a regular shaped town of about 10,000 to 12,000 inhabitants, but reduced, in point of numbers, to 3000 or 4000 by the Muhammadan insurrection. Ngan-lin, situated westward of the lake, on the river issuing therefrom, occupies a point on the road between Yunnan-sen and Tali, and has been entirely destroyed by the Muhammadans. The people call themselves Chinese, but, having mixed with the aborigines, have lost many of the characteristics of the former. Ho-long-tse, to the north, is famous for its hot springs, and there are here pagodas provided for bathers. After having returned to Kwen-yang, M. Dupuis proceeded southward and crossed the water-parting between the basins of the Yang-tse and Si-Kiang. The plain of Sin-shin beyond is about 18 miles by 8, and is certainly the richest in Yunnan, yielding, as it does, three harvests per annum. The town of Sin-shin is more important than that of Kwen-yang. In 1871 it was in the hands of the Muhammadans, but these have since been ousted from power. From Sin-shin there are two routes to Tong-hai, one by way of the Tong-chan, and another by the Tong-kow Valley. The former contains fifty-two towns and villages, with numerous pagodas, while the latter is inhabited almost entirely by a race of savage mountaineers who had not succumbed to the raids of the Muhammadans. In the Shi-ngo mountains, to the south west of Sin-shin, there are iron mines and foundries. The mountaineers referred to are strong, hard working, and hospitable. The women carry round their necks plates of silver, on which are embossed figures of animals and characters.

Before reaching the Tong-hai Lake, M. Dupuis stayed a few days with the Chinese General Ma, who had come to take the town of Tong-keow, a town which had been seized by the Muhammadans, and which they did not yield before they had been reduced to their last supplies, and had actually poisoned their own wives and children.

M. Dupuis remarks that this bloody rebellion arose from some quarrel regarding the working of certain gold mines, in 1855, and that Chu, the *futai*, or governor, of Yunnan, then ordered by proclamation a general and indiscriminate massacre of all Muhammadans. This proclamation was said to be due to the instigation of the treasurer, or *fan-tai*, a young but able Tartar, named Tsin-chen. The slaughter of Muhammadans at Posi, Hoa-si, and in the vicinity was enormous; but the Muhammadans were soon on the alert, and the retaliation effected by Ma-hien, who placed himself at their head, actually caused the death (so M. Dupuis was informed) of a million people. Ma-hien, having become master of a portion of the province, then came to terms with the Chinese, was created marshal by them, and undertook, in return, to stamp out the rebellion in the west. He did his best to persuade Dupuis to put off his journey, but without success, as the latter continued his journey across the lake to Tong-hai.

Tong-hai was the next town in importance to Yunnan-sen seen by the travellers. They were received with great coldness and suspicion by the Governor, Hu—a savage with a thin veneer of Chinese civilisation. He, nevertheless, appeared to manifest some interest in the question of the future trade route, and, offering him an escort of 200 men, recommended Dupuis to repair to Lin-ngan. This advice was, however, considered unsafe by M. Dupuis, and, accordingly, he set out north-eastward for Ning-chow on the 14th April. Kwang-y, a town to the south, acquired fame subsequently through its siege and desperate defence, which lasted fifteen months, and caused the death of two-thirds of the garrison.

At Laly-kai, on the upper Yu-ho, cholera—which had appeared in Yunnan, in the track of rebellion—was so virulent as to have occasioned the flight of the inhabitants. The Laly-kai and Hoasi valleys have both been subject to the raids of the Posi and Kwang-y rebels, and the inhabitants have had to keep a constant watch over their fields and dwellings. Both Laly-kai and Shin-tien-ge, a little to the south-east, are situated in the valley of the Yu-ho, or Canton River. Hami-chow, still further to the south, is situated in a remarkably rich plain, but the town itself is wholly destroyed, and the neighbourhood in the hands of the Muhammadan rebels. These, however, to the number of 2000, accorded a friendly and even grand reception to the travellers. At Mon-tze, further south, the country becomes more sterile, and the spurs of the great mountain range stretching from Tibet to the Gulf of Tong-kin are reached. The inhabitants of these mountains are called Yjens, or savages, by the Chinese. Mon-tze is a great trade-centre for products of southern and central Yunnan, which go to Kwei-chow, Quang-si, or down the Canton River. The principal articles are metals, tea from Pu-yul-fu, cotton from the Laos people, on the Mekong side. Tin is obtained from mines about 20 miles to the south, which have yielded the metal for a century past. At Mon-tze, M. Dupuis was left by his secretary, Wang, to pursue his journey with a civil mandarin and 80 men. After journeying through the mountains to the south, M. Dupuis came in sight—on the 23rd April—of the Hong-kiang, or Red River, at Mang-hao, where it is over 100 yards wide. The surrounding mountains are between 5000 and 6000 feet in height, from base to summit, which would make the plain of Mon-tze about 3000 feet above the level of the river. Mang-hao is not visited by the Yunnan people, owing, apparently, to the difference of temperature, and its effect on their health. About 35 miles to the south there are mines yielding gold, silver, copper, tin, lead, coal, and other minerals. The frontier between Yunnan and Tong-kin touches the Red River about 22° 35′ N. latitude, and, following its course for about 20 miles, finally quits it at Lao-kai, where the territory occupied by independent tribes between China and Tong-kin commences.

M. Dupuis remarks of Yunnan, that it is, without doubt, the richest metalliferous country in the whole world, and that nearly all the minerals are to be found on or near the surface. In the south and south-west of the province, the Chinese form about one-tenth of the population, and inhabit the towns, the valleys, plains, and nearly all the fertile tracts. The temperature is most equable, and rarely ascends above 26° C., or descends below zero.

Lao-kai, as well as Mang-hao, is now in the hands of the Black-flag bandits, who slew Francis Garnier and four French companions in 1873. These bandits levy custom dues on all goods passing Lao-kai, and derive thence an annual revenue of upwards of five and a half millions of francs. Below Lao-kai are to be found extensive forests, which yield very superior timber of different qualities. The fauna of the region is very exuberant; the elephant is found in herds on the southern bank, but never crosses to the northern; the buffalo, wild ox, and rhinoceros are also found. The royal tiger runs to a great size, and panthers, leopards, and large grizzly bears are common. Deer, wild goats, wild boars and chamois form part of the game, and the musk goat and wild sheep frequent the upper part of the river near Yunnan. Among feathered game are to be met the peacock, several kinds of pheasants, partridges, and numerous specimens of aquatic birds.

The Black-flag bandits appear to wish seriously to obstruct the efforts of the French to open up communications between Yunnan and the coast, and M. Dupuis is of opinion that little can be done to further trade till they are reduced to subjection.

Many gold mines are said to exist in the country of the Muong-la, on the Black River, between the Red River and the Mekong. Silver is also exceedingly plentiful there. M. Dupuis remarks of the independent tribes between the Red River and Yunnan that they recognise as chieftain a certain chief who lives at Shuien-tien, in the mountains close to China, in the direction of Ho-yang, and claims descent from the former sovereigns of Yunnan. M. Dupuis halted at Kwen-tse. Here the forests terminate, and cultivation makes its appearance, rice, sugar, tobacco, cotton, &c., being produced in the proportion in which they are enumerated. With regard to the He-ho, or Black River, he remarks that its course has been laid down entirely erroneously hitherto. Its confluence with the Hong-kiang has been placed at Lao-kai hitherto, whereas really it joins that stream near Hung-hoa. It is navigable for boats as far as Muong-tai. The Clear River, on the north-eastern or left bank, is navigable for nineteen days' journey from its confluence with the Hong-kiang.

Between Mang-hao and Long-po the navigation of the Red River is difficult, owing to the number of rocks and boulders which obstruct the centre of the channel, and a system of towing by chains or wire ropes may become a necessity. M. Dupuis returned to Yunnan on the 28th April, and finally reached Hankow on the 16th December 1871, having traversed in all upwards of 6000 miles.

His second expedition, consisting of two gunboats, a steam launch, and a large junk, as tender, left Hong-Kong on the 26th October 1872. He was detained for some time at the mouth of the Red River, owing to the intricacy of the channels, obstructed as they are by the sand brought down to a distance of ten miles. A detailed survey is much required. The tides here, M. Dupuis observes, last four-and-twenty hours, and the high tides re-occur about the 1st and 15th of the month. The Trali proved to be the channel used for navigation, though the Balat is the largest.

An interview with the Royal Commissioner, Ly, at Hai-phong, was obtained by M. Dupuis, through Commander Senez, of the 'Bourayne.' The Commissioner said the proposed opening up of the Red River must be referred to Hue; but, on the departure of the 'Bourayne,' he threw off the mask, ordered barriers in the river to be erected, and forbade any provisions to be supplied to the expedition. Accordingly, M. Dupuis, seeing the importance of prompt action, began to ascend the river Cam, from Hai-phong, as far as the Thai-binh River, where, at a place called Lu-to-kiang, the people were less hostile, and brought supplies. M. Dupuis explored the Song-ki Canal, between the Thai-binh and the Red River; but, at a distance of 7 miles from the latter, his steam launch was obliged to return, owing to the want of sufficient water. As far as Bac-ninh the land on either hand of the river Cam is low and deltaic; but on the left bank may be seen the spurs of the great range which surrounds the delta. To-ha, above Bac-ninh, is a large place of from 10,000 to 12,000 inhabitants, and various articles of earthenware are there manufactured. A smaller canal is in existence, some distance above To-ha, but it is only navigable at the rainy season. At its confluence the Thai-binh diverges to the north. Here M. Dupuis decided to return, and to seek communication with the Red River by the Trali mouth; but about 15 miles before reaching the mouth of the Thai-binh, an arm of the Red River, called Cua-loc, and of 1 fathom minimum depth in the dry season, was discovered. After considerable obstruction had been raised by the Annamites, who spoke of M. Dupuis as the precursor of "the brigands of Saigon," the expedition finally entered the Red River on the 18th December, and arrived at Hanoi four days later. All means were employed by the Annamites so as to discredit the Europeans; but the pacific demeanour of the latter soon quieted the natives and the Chinese traders, of which there are a great many.

M. Dupuis observes that when the country is open to commerce, navigation will be by way of the Thai-binh and Cua-loc, and from Hanoi up to the frontier of China. During the dry months, vessels will be obliged to tranship goods in the Cua-loc on to flat-bottomed river boats, drawing 6 to 7 feet. The delta of the Red River has been surveyed recently by Messrs. Bouillet and Heraud. The entire navigable distance of the river from the mouth of the Thai-binh, by way of Cua-loc and Mang-hao, is 414 miles.

The chief article of cultivation in Tong-kin is rice, and next to that, silk, the centre of which industry is the valley of Thai-nguyen. The silks are light and inexpensive, owing to the cheapness of labour, but are badly prepared for the market. Embankments, which serve also as roads, are numerous in Tong-kin, owing to the disastrous effect of the rains. The population is found almost entirely in villages, isolated farms and houses, as in China, being unusual. The agriculturists are the most numerous and the most moral, the mandarin class being dissipated and extortionate.

M. Dupuis was favourably received at Kwen-tse, though instructions of a hostile nature to him had been sent to the Annamite general there, and though a barrier across the stream was actually being constructed. He nevertheless managed to pass it, and was eventually received with open arms at Lao-kai and Mang-hao, whence he made his way to Yunnan. He records, in conclusion, his opinion that nothing but a little energy and perseverance is required to make this promising route one of considerable importance.

We ought to mention that a map giving detailed topographical information accompanies M. Dupuis' article.

DELTA OF THE YANGTSZE RIVER IN CHINA.

M. Elie de Beaumont in his *Leçons de Geologie Pratique* remarks that "the different forms of river deltas appear to be only varieties of the same fundamental type. The phenomena which contribute to their formation, and the process even by which human industry affects them, have everywhere the greatest similarity; and the circumstance that these phenomena present a series of phases almost as marked as those of the development of an organized being, greatly augments the interest of their study." If we apply these pertinent remarks to the subject in hand, and compare the Delta of the Yangtsze with that of the Ganges, they are fundamentally the same in their geological formation, but in their geographical features they differ as much as the Chinese of the pure Mongol race do from the Hindu. On referring to a map of Asia it will be seen that the latter disembogues into the Bay of Bengal through numerous mouths branching from the main stream, three of which form considerable subsidiary rivers; while the former has only one embouchure into the North Pacific Ocean, but divided into two great branches by the island of Tsung Ming. Notwithstanding this marked difference in the estuary of the Yangtsze from that of the Ganges, the extent of the delta is equally as great on the seaboard, and its area inland still more so, where the subsidiary waters of the Great River (*Tai Kiang*)—as it is sometimes called by the Chinese—spread out into a series of lakes or lagoons; the *Tai Hoo*, or Great Lake, forming a central reservoir for the innumerable smaller channels, which intersect the greater surface of the delta with a network of canals and ditches. If, therefore, we designate the alluvial lands of the Indian river through which its ana-branches flow into the sea a *River-delta*, those of the chief Chinese stream may be appropriately termed a *Lake-delta*, as forming the leading characteristic of its geographical features.

On ordinary maps of China this lake feature of the Yangtsze Delta is not well defined, as most of them have been projected on the basis of the old surveys made by the Jesuit fathers upwards of two centuries ago; and our Admiralty charts, which delineate the river and sea boundaries correctly, but do not give more than a general outline of the delta. This deficiency, so far as the southern section is concerned, was made good during the latter years of the great Taiping Rebellion, 1862–5, when Colonel Gordon succeeded to the command of the disciplined Chinese troops, which assisted chiefly in suppressing the civil war in China. Under his directions, Lieutenants Sanford, Lyster, and Maude, of the Royal Engineers; Lieutenants Danyell and Bateman, of H.M.'s 31st Regiment, Assistant Engineers, and a detachment of Sappers and Miners, surveyed the greater part of the delta, frequently exposed to the fire of the rebels, and other dangers incident to warfare between semi-barbarous belligerents. The results of that survey, under exceptional difficulties, were forwarded to the late Sir Henry James, Director of the Topographical Department of the War Office, Southampton, who had two maps printed by the zincographic process, one on the scale of an inch to the mile, and the other five miles to the inch, and entitled "Military Plan of the Country around Shanghai." This plan presents at a glance the characteristic lake features of the delta, over a triangular area, measuring 180 geographical miles along the right bank of the Yangtsze; about the same distance on its south-western surveyed boundary; and 122 miles of its frontage to the sea, the whole superficies approximating to 5400 square miles.

About the central region of that area the lake districts are well defined, excepting one to the westward, which was not entirely surveyed. However, the shores of the Tai Hu, or Hoo, are laid down clearly, and the rocky island and banks to the east and west, which form exceptional features in the general aspect of the delta, which is that of a level plain only a few feet above the river at high floods, and the sea at spring tides. According to the plan this Great Lake is, in round numbers, 150 miles in circuit, something in the form of the Phrygian cap of liberty, and an area of about 750 square miles. To the eastward, about 15 miles from the mid-shore, stands the famous city of Soochow, beyond which a series of small lakes begin, and stretch onwards towards the south branch of the estuary, forming the leading channel up the Yangtsze, and to its branch stream the Wong Poo, where the harbour and settlement of Shanghai are situated. There are twelve of these, all united to each other by narrow channels through the alluvial soil, with areas of dry land between, which at some former period were submerged, and formed one large lake, but not half the superficies of the Tai Hoo.

Looking at this territory from a geological point of view, we perceive a remarkable example of sedimentary deposit formed by the turbid waters of the Yangtsze, charged with the abrasion of rocks from 1000 to 2000 miles in the upper gorges of the river. Evidently, at a comparatively recent epoch in the formation of strata, the mouth, or probably mouths, of that mighty stream were near Chinkeang, as shown in the plan, 160 miles from its embouchure at Shanghai; all the intervening area from these points to Hang-chow, at the south point of the triangle, having been covered by the sea, with the groups of hills in its central region rising as islands, like those in Tai Hoo Lake, and off the coast before entering the estuary. As the current of the river met the flowing tide, the sediment *in situ* was deposited, and thus, in time, formed the vast surrounding plain. The rapidity of this formation may be estimated from a few facts culled from Chinese history. From this we learn that in the tenth century of the Christian era, and during the reign of the Sung dynasty, Shanghai first received its name—from *shang*, high, and *hai*, sea, which means literally "upper sea." "The account which seems most probable, as it is the most natural, is that there were two regions or rivers, one designated the *Lower*, and the other the *Upper Sea;* and hence, it is said, was derived the name. Others say that there were eighteen great rivers, among which one was called the Lower Sea, and another the Upper Sea, and hence the modern name. We also find the characters reversed—*Hai Shang*, 'Upon the Sea,' indicating that the city or district was situated contiguous to or upon the sea."*

---

* *Chinese Repository*, vol. xvi.

The foregoing quotation was written by Dr. E. C. Bridgman, the learned editor of the *Chinese Repository*, whose accuracy and knowledge of Chinese have constituted that rare serial—the publication of which ceased thirty-six years ago—one of the chief authorities on the history of the empire. Of the accounts given as to the derivation of the name, we incline to the last mentioned, "Upon the Sea," as it accords most with the geological and geographical changes in the district, where, within the memory of living residents, native and foreign, the land on what is called the Pootung Peninsula has encroached upon the sea from 1 to 2 miles, and the waters shoaling in proportion, so that some years ago the Kintoan Beacon, marking low water mark, on the muddy shore, had to be moved several hundred yards. At present Shanghai is 17 miles distant, in a straight line from that point, and it requires no great stretch of theory to infer that at the period referred to—A.D. 960—the city was walled in, and its name changed from *Lan* to *Hai Shang*, "Upon the Sea," and since then, when that became no longer appropriate, the characters were reversed into Shanghai, without any specific geographical meaning.

In another paragraph of his introduction to the "Description of Shanghai," as situated in the ancient province of Kiangnan, now divided into the Kiangsee and Kiangsoo provinces, he remarks:—"Once, no doubt, the eastern plains of Kiangnan were partially if not wholly beneath the surface of the sea, but the earth accumulating has by slow degrees driven back the waves. The water-courses, however, are still very numerous, and some of them deep; and the currents, moving with the rising and falling of the tides, very powerful. Consequently, many of the channels have changed their beds. The river Woosung is an example of this. 'Twelve centuries ago, in the time of the Tang dynasty,' says the Chinese historian, 'the river of Woosung was twenty *lee;* in the time of the Lung dynasty it was nine *lee;* afterwards it gradually lessened down to five, to three, to one *lee*.'" As there are three *lee* to one mile this branch of the Yangtsze has dwindled down from seven to less than one half in width during 1250 years. In the sequel, it will be shown that this is an important fact, leading to serious changes in the harbour of Shanghai. Meanwhile, let us revert to the statement from historical records, "that there were eighteen great rivers" in the delta. If we accept this as founded on fact, it points to a period when the Yangtsze had several "mouths" for its outlet into the ocean, similar to those of the Ganges. On reference to Gordon's map, this is supported by the tortuous reaches of the river below Chinkeang, which are probably the old arms of some of these mouths, which in time have closed up on the southern bank, and altered the features of the region between that locality and the sea from a river to a lacustrine delta. Assuming this to have been the case, there is evidence to show that this closing up of the great channels, and forcing the surplus waters into the main stream, besides innumerable small channels, was materially assisted by the agricultural industry of the inhabitants. From time immemorial the Chinese located on these low lands have been in the habit of raising dykes, like the Hollanders in the Netherlands, to reclaim the deposits of sediment by the river, and defend them, when cultivated, from the flooding of the stream, or the encroachments of the sea. In this manner, and by the increasing labours of the most industrious population in China, numbering at the present day not less than ten millions, they have assisted nature in contracting the great branch streams to insignificant channels in width, but which, by their length and multiplicity, render them of the utmost importance as canals for navigation or ditches for irrigation.

Of these the famous Grand Canal intersects the delta from Hang-Chow Foo in the south to Chinkeang in the north, traversing the country to the eastward of Tai Hoo Lake, and passing through the city of Soo-Chow Foo. In the environs of the latter city there are branches from the great canal which lead into the great lake to the westward, and the group of smaller lakes to the eastward. These, with the Shang Fang Hills, which overlook the city and its suburban waters, render it one of the most picturesque spots in China. Before it was ravaged by the Taiping rebels, the Chinese spoke of the capitals of Kiangsoo and Chekiang in their flowery language:—"Above, there is paradise (or the palace of Heaven); below, are Soo-Chow and Hang-Chow." This was specially applicable to the luxurious residences with gardens in the vicinity of the lakes, when these cities reached the acme of prosperity from which they have declined.

This lake district was known to the English and other foreign residents at Shanghai; but few, if any, had a definite idea of the position, extent, and number of them. On ordinary maps the Tai Hoo was laid down, but its outline was variously delineated, and none of them correct, without any of the smaller lakes shown. This section of Gordon's map is, perhaps, the most interesting and novel portion of it, and we have gleaned much useful information about their capabilities of navigation not previously known. The Great Lake, as already stated, is over 150 miles in circumference, with a superficies approximating to 750 square miles. It is from 10 to 15 feet deep, with shallower water here and there, that should be avoided by vessels drawing 6 to 8 feet. There are numerous entrances to it, from all points of the compass, for small native boats, but only one for large junks or small steamers. The latter is at the extreme eastern boundary, where its waters form into a small subsidiary lake near Wu-Kiang. Here the navigation is intricate, as there is a bar at the entrance, with a channel leading to it, which should be approached only at high water. Once inside the lake, it presents a most picturesque prospect, with an extensive horizon, broken only by the hills on its eastern and northern shores. The highest range is the latter, some of the hills rising to a height of 800 feet, covered with grass and herbage, where, in peaceful times, sheep and cattle browsed. The islands are highly cultivated, and infested by pirates, who, it is said, have never been subdued by the imperial authorities, so that they live an independent, lawless life, preying on their industrious countrymen living on the mainland.

The smaller lakes have an average depth of 9 feet, but most of them shoal on their eastern shores. There has always been considerable traffic on these lakes, and the surrounding country was in the highest state of cultivation, with a dense industrious population before Soo-Chow fell into the hands of the Taipings. When the rebellion was thoroughly subdued in 1865, those who had survived its sanguinary ravages returned to their homes, so that now it has recovered in a great measure its former smiling aspect. The facilities for commerce in this district by water communication are extensive, for small steamers as well as junks. During his campaign, Colonel Gordon navigated the creeks, canals, and most of the small lakes in the 'Hyson' steamer, drawing eight feet water. From Shanghai he took that vessel through intricate channels, delineated on his military plan, to Tai-tsan; thence to Soo-Chow, and on through the Tai-Hoo Lake, to Kin-tang, a town on the western shore of a large lake, which he had not the opportunity of surveying completely before the disciplined Chinese force he commanded was disbanded and he had left the country, after a most arduous and eventful campaign of three years.

Regarding the smaller channels, it was impossible for Gordon and his gallant military surveying party to do more than indicate their intersection at the points he passed them in his linear measurement of the more important creeks and canals in his line of communication for military purposes. At an approximate estimate, we calculate the area of all the lakes at 1200 square miles, and deducting this from the computed superficies of this southern section of the Yangtsze Delta, delineated on the plan, at 5400 square miles, the remainder is 4200 square miles of land intersected by these small channels, used for navigation and irrigation. As already stated, the whole net-work of water communication is not laid down on the map, but the intersections are; consequently we can arrive at some estimate of their extent. These are more numerous in some districts than others, but taking an average of those within 100 square miles on the Pootung Peninsula eastward of Shanghai, we find more than 200 miles of water ways, ranging from 5 to 15 feet. Reducing this average, however, for the sake of accuracy to 120 miles, and the whole area of land intersected with first-class channels to 3000 square miles, we have the total length computed at 36,000 miles of creeks, canals, and ditches, nearly the whole being navigable by sampans, junks, and steamers of various sizes. The actual linear measurement surveyed by Gordon and his staff was not less than 1700 miles, including the grand canal, and if we add the circuits of the lake shores at 280 miles, we have a total of 2500 miles surveyed by theodolite and chain on the Delta of the Yangtsze. A writer in the *Times*, commenting on this survey, says:—"Such a task undertaken in a peaceable country would be one of no small magnitude; but when we consider that nearly the whole of it was performed in the face of a bloodthirsty enemy, the surveyors being frequently under fire, and at all times risking their lives from the attacks of marauders, or the deadly malaria of that marshy region, this map illustrates an example of 'the pursuit of knowledge under difficulties,' that redounds to the credit, skill, and perseverance of Gordon and his staff of Royal Engineers." To this we may add Assistant Engineers and Sappers.

The only region in Europe that can compare with this system of natural and artificial channels for navigation and irrigation is the Delta of the Po, and the Plain of Lombardy. About one-sixth of the whole plain is irrigated, and about one-fifth of its productive area, equivalent to 1658 square miles. Many of the larger canals are used for navigation and commerce as well as irrigation; and the entire length of the great canals, with their first-class branches has been estimated at 4500 linear miles, using up one half of the average discharge of all the affluents and the main stream. If we double that total, to include all the smaller channels for irrigation, this would give 6 miles to every square mile, or 9000 in all, and still that is only one-fourth the extent of the Yangtsze Delta water ways as they are delineated or indicated on Gordon's map, which extends to not more than probably half that alluvial region.

Referring again to the statements of the Chinese historian, quoted by Dr. Bridgman from a work entitled *Kiaking Shanghai hien chi*—A Statistical account of the district of Shanghai in the reign of the Emperor Kiaking—he says, after showing the contraction of the Woosung River from 7 miles to one-third of a mile:—"The beds of other rivers have been gradually filled up, and the streams no longer to be seen. Cities, towns, and markets have also risen, flourished, and disappeared." Although nothing so desolating as these calamities threatens the great emporium of foreign and native commerce at the port of Shanghai, yet the rapid silting up of sediment on the Woosung bar, at the entrance to the main channel, will, ere long, become so shallow that ocean steamers may not be able to cross it even at high spring tides, unless dredging operations be vigorously prosecuted. This is the practical part of our subject, which commends itself to the consideration of all persons interested in the trade of that port, which last year exceeded, in exports and imports, thirty millions sterling. The topic has been recently brought before the foreign consuls and other residents at Shanghai, through the columns of the *North China Herald* and other local newspapers, where it has been freely discussed; while the British and other officials in the settlements have represented and brought before the Chinese authorities, who are the conservators of the river, the urgency of taking active measures to prevent the threatened danger to its navigation. To these solicitations they have lent a deaf ear, and, though deriving a revenue of nearly two millions sterling from duties on foreign merchandise, they do not seem inclined to spend any money on the purchase of dredging machines, or otherwise assist in clearing away the silt to deepen the water on the bar. The chairman and members of the consular body at Shanghai have not been idle, and, in order to ascertain the extent of the growing obstruction, with estimates for the cost of removing and preventing further encroachments, they requested two eminent Dutch engineers, named G. A. Escher and Johs. de Ryke, specially skilled in this branch of hydraulics, to examine the estuary of the Yangtsze, which they have done effectually, and produced an elaborate report, with diagrams, which is now before us.

The leading object of the survey and report was "An Enquiry into the Present State of the Estuary of of the Yangtsze Kiang, more especially with regard to its bearing upon the Navigation to and from Shanghai." Then Mr. de Ryke goes on to state that, "Last summer, Mr. Escher and I accepted the invitation of the Board of Consuls at Shanghai to draw up a report upon the 'Inner Bar of the Wongpu or Woosung River,' and to make a plan for improving that part of the fairway." On Gordon's plan this channel is named the Hwang-pu, without being designated a river, and we think that it has not the hydrographical features of ordinary rivers. It partakes more of the nature of a creek, or inlet from the sea, inasmuch as the tide has, probably, more influence on its waters than the outward current. Be that as it may, it is an exceptional stream that its sluggish waters should be so rapidly narrowed and shoaled, as shown in this report; wherein it is stated that the capacity of its waters "is chiefly dependent upon the rise of tide at its mouth, for this is by far its largest power. If that be the case, then there cannot be sufficient "scouring out" of sediment to prevent its continually "silting up;" and, consequently, what was supposed to be "a broad, deep river," as stated by Dr. Bridgman, in 1847, shortly after the foreign settlement was founded on its western bank, turns out to be nothing more than a semi-lake channel, which is rapidly dwindling into a narrow creek or natural canal, suitable only for vessels of light draught, or flat-bottomed junks. This would be nothing new, if we may trust the Chinese historians of the Delta, who state that the departmental city of Soonkiang, with eight districts, one of which is that of Shanghai, was formerly a great seaport on the Upper Hwang-pu, but now it has only a narrow boat channel of 2 miles to the lagoon stream.

On this important subject, which materially affects British and other foreign interests at the port, we cannot do better than give an extract from the *North China Herald*, as follows:—"No one who has been in the habit of passing occasionally along the Bund (the Marine Parade at Shanghai) can have failed to notice the narrowing of the river channel which has taken place during the last ten years; but the change is so gradual that its full extent can hardly be realised without comparing charts of the two periods. We have had an opportunity of examining two maps of the river, one made in 1866 and the other in 1875; and the results disclosed are so startling that, if they can be brought home to the Chinese comprehension, it would seem impossible that they should any longer neglect the river, unless they wilfully choose to let Shanghai die out as a port, and subside into the condition of Soonkiang and Quinsan, which tradition speaks of having been ports themselves at no very remote period. In 1866 the width of the channel at low water, between Pootung Point and the Peking Road Jetty, was 1820 feet; in 1875 it was only 1250 feet; and it has since (June 1877) still further narrowed; and not only has the river thus narrowed by one-third, but it has decreased in depth at the same time, the deepest soundings between these points being now only 83 feet, against 95 feet twelve years ago. It would be difficult to prove more clearly than by these simple figures how urgently the channel needs not only conservation, but artificial aid, if Shanghai is to remain a port. If 'scour' were to be depended upon in the Hwang-pu, if the downward current had any appreciable force, the narrowing of the channel would have been accompanied by a deepening; the water would have had either to make more room for itself by cutting deeper, or would have overflowed. But neither contingency has happened; and the fact is made clear that the downward current is of the most feeble character, and the river little better than an elongation of the lakes with which it is connected. The strong currents are simply caused by the flow and ebb of the tide; and in the interval between these there is scarcely any perceptible movement."

The Dutch engineer's report treats in detail, with numerous diagrams, of the methods to be adopted in constructing artificial dykes, and other means to remedy the serious drawbacks to the navigation of the port, both outside and inside the bar at Woosung. It is not the purport of our paper to comment upon these; but as the question of dredging has been a matter of controversy, not to say contention, between the Chinese Government and the foreign consuls, it is worth while looking at it in an impartial light. The former object to spend money on dredging machines and their maintenance, because they consider it would be throwing it away in the face of the natural obstacles to contend with; at the same time that the shallowing of the channel would scarcely affect the flat-bottomed junk traffic. So far, they are supported in these views by the Dutch engineers, who state that to dredge the outer channel would be ineffectual, as the operations would be useless after a heavy storm. However, this might not be the case in dredging the bar at Woosung. Be that as it may, if the channel up to Shanghai, which is about 14 miles, is filling so rapidly, as shown by the *North China Herald*, then the dredging operations would require to be carried throughout that distance to be effectual, and, of course, the cost would be proportionately greater. But if the residents are not able to induce the Chinese authorities to bring deep water for their ocean steamers to the settlements, there is a prospect of reversing the operation, by taking the settlements to the deep water at Woosung. The distance is about 10 miles, and an experimental railway has been laid down, which brings it within half-an-hour of old Shanghai. On the eligible site at the village within view of the Yangtsze estuary and the sea itself, a new settlement might be formed, and the ancient name revived of *Hai Shang*, "Upon the Sea," and likely to be so for centuries, if not for all time.

In concluding this sketch of the Yangtsze Delta, we have not touched upon that portion of it to the southward of Gordon's plan, simply because the available data is not to be relied on. For similar reasons, and also for want of space, we have not given any account of the island of Tsung Ming, forming a considerable part of the true delta, or tongue in the middle of the estuary, and the great section on its northern shore, where the alluvial lands of this "Child of the Ocean"—as the people fondly name it—join those of the *Hwang Ho*, or Yellow River; which the Emperor Kienlung designated "China's Sorrow," from the vagaries of its erratic channel and embouchure. Estimating the extent of the whole area of the delta north and south of the river at double that of the country surveyed by Gordon, or say, 10,000 square miles, this would make it more than one-fourth the superficies of the Province of Kiang-soo, which has been computed at 39,150 square miles, where a population of 37,843,500 existed previous to its decimation by the Taiping Rebellion. Probably no territory in the world, of similar extent, is better watered than this province for agricultural purposes, with greater fertility of soil, cultivated to the highest degree by skilful labourers, who have made it the "Garden of the Provinces," and the Yangtsze Kiang the "Girdle of China."

Samuel Mossman.

A DESCRIPTION OF THE ISLAND OF FORMOSA.

With some Remarks on its Past History, its Present Condition, and its Future Prospects.

It is only a very few years since the Island of Formosa, or Taiwan, as it is called by the Chinese, was practically an unknown land, and even now the number of Europeans who have penetrated into the interior is very small.

In April 1877, business took me to the island, and during my stay I visited all the treaty ports, and journeyed overland from Taiwan-fu to Kelung, a distance by road of 218 miles.

My business gave me the *entrée* of the Governor's Yamen, and required that I should collect as much information as possible, from observation and from reports, as well as from interviews with those acquainted with the country. Although I did not penetrate into the savage district, and cannot therefore describe any previously unknown land, still I believe that much of the information contained in the following pages has never been published, and I have no doubt will be found useful by any one wishing to visit the island, or to make himself acquainted with its present condition or future prospects.

Formosa is an island about 240 English statute miles long and 90 miles wide, lying between N. lat. 22° and 25° 20′, and about 120 miles distant from the coast of China.

The Chinese had a knowledge of the existence of the island at a very early date, but they do not appear to have become really acquainted with it until the year 1430, when some junks were driven there by stress of weather. It is probable that most of the very early Chinese settlers were shipwrecked sailors.

About the year 1622, the Dutch settled in the Pescadores, a group of small islands lying about 30 miles to the west of Formosa. In 1624, at the instance of the Chinese, they removed to Formosa, and there built Fort Zelandia, the ruins of which still exist near Taiwan-fu.

In 1626, the Spaniards built a fort at Kelung, but the Dutch drove them out, and, to make themselves more secure in the north of the island, they built a fort at Tamsui, part of which now forms the office of the British Consulate.

In 1644, the Manchu Tatars gained Pekin, and very soon afterwards became rulers of the greater portion of China, and, in order to escape from the conquerers, 25,000 Chinese emigrated to Formosa.

In 1662, a pirate chief called Koxinga, at the head of a force of Chinamen, drove out the Dutch and became ruler of the island; and in 1682 Formosa passed into the hands of the Imperial Government of China, and it has ever since remained part of the Chinese province of Tokien.

Although nominally a part of China, the sovereignty of the Chinese only extends over about half the island; over certain other parts they exercise a nominal sway, but there are still some portions into which no Chinaman dares to enter.

Formosa has not been without its troubles. In 1782 it suffered from a disastrous inundation, and in 1788 there was a serious rebellion. Again, in 1832 to 1833, there was a rebellion caused by the oppression of the Chinese officials. The horrors of this rebellion were aggravated by the fact that the various clans of Chinese who had emigrated to Formosa from different parts of China, took this opportunity of fighting with each other. This division of the camp, however, enabled the authorities eventually to quell the insurrection.

Up to much more recent times the island was noted principally as a place where a shipwrecked crew were sure to be murdered, and likely to be eaten. Although the Chinese inhabitants were never accused of being cannibals, they were quite as desperate wreckers as the natives.

One of the most noted cases was that of the British brig 'Ann,' wrecked on the coast of the Tamsui district on the 11th March 1842. The crew and one passenger, fifty-seven in all, reached the shore, and tried to get away in two junks. The people on shore, however, would not allow this, and took them all prisoners. They were stripped naked and put in prison. They were soon marched to Taiwan-fu, having no clothing with the exception of a few articles given them by the more kind-hearted of the Chinese. Here they were imprisoned in a granary. On 13th August forty-four of them were taken to the execution ground, and forty-three beheaded. One man, having obtained a little money, had bought some drink and became intoxicated. He stood on his head before the magistrate and muttered some words he had heard used in a joss-house. He then performed some acrobatic feats, and the magistrate said he was a good man, and should not be beheaded. He was afterwards liberated, with seven others, and arrived in Amoy on 24th November 1842. One other was sent to Hong Kong, where he arrived 2nd April, 1843; two died on the day of the wreck; two died in prison; and one escaped. At the same time a large number of men from the 'Nerbudda' were murdered. The total number of British subjects beheaded, including those from the 'Ann,' was 197.

On the matter being investigated, it appeared that the Chinese officials in Formosa represented to the authorities at Pekin that these ships were war vessels, and had been captured after a severe battle; and not only did the Central Government approve of beheading the prisoners, but the officials received promotion. When the British Government found out the truth, the matter was brought before the notice of the Emperor, and a proclamation was issued degrading the Formosan officials, and ordering the principal ones to be brought before the Board of Punishment. It does not appear that anything further was done. From time to time, after this, wrecks took place on the Formosan coast, and, in each case, all or some of the crew were murdered.

In September 1850 the 'Larpent' was lost on the south coast, and only three of the crew escaped; some of the remainder being drowned, and the others murdered.

In 1851, when a Chinaman was sent to Formosa to search for any sailors who might be in captivity, he was shown a warrant for the arrest of all foreigners, and of all Chinese in the service of foreigners, who were found on the island.

Matters remained in this position till 1858, when Taiwan-fu was opened to foreign trade by the British, French, and United States treaties, and Tamsui by the French treaty in the same year.

In 1863 Takao was opened as a dependency of Taiwan-fu, and Kelung as a dependency of Tamsui, by provisional Customs regulations.

The principal Customs Office in the north of the island is at Tamsui; but in the south of the island it is at Takao, the office at Taiwan-fu being subordinate to it.

British Consuls were first appointed to Formosan ports in 1862. The trade of the island was so small that in 1868 it was proposed to take them away, and so save the expense of the consular establishment. The merchants, however, protested, and explained that the trade was small only because it was not developed, and that, after leading them to suppose that consuls would be stationed permanently, and so inducing them to invest capital in Formosan trade, it was most unfair to remove them while the trade was promising to increase. As late as 1871, reference is made in the consular reports to the great excitement the proposal had occasioned. Trade has now increased to such an extraordinary extent that there is no chance of the proposal being repeated.

Even subsequent to the appointment of British consuls, the natives were in the habit of murdering the crews of any vessels wrecked on their coast. The crew of the U.S. vessel 'Rover' met with this fate, and the U.S. consul at Amoy, of whose district Formosa formed a part, seeing that it was useless at that time to negotiate with the Chinese authorities, who were powerless, determined to go direct to the savages.

On the 15th October, 1867, this gentleman, General Le Gendre, made a treaty with Tok-e-Tok, the chief of the savage tribe inhabiting the southern portion of the island. This chief undertook, on behalf of his tribe, to abstain from molesting strangers, and promised to supply them with water and provisions, if necessary; and the Chinese of the district undertook that if any stranger fell a victim, they would search out the guilty parties and punish them. This treaty, although not entirely successful, has had most beneficial effects. Several sailors wrecked since then, on the southern coast, have been sent to foreign settlements.

General Le Gendre was one of the first who did anything towards the topography of the interior of the island.

Some few years ago, some inhabitants of the Lew Chew Islands, over which the Japanese claim sovereignty, were murdered by the savages in Formosa. In order to avenge their death, and to prevent a repetition of such barbarities, the Japanese sent an expedition, in 1874, to punish the culprits. The Chinese disclaimed responsibility; and when, in consequence of this the Japanese landed their troops, the Chinese were pleased and saluted them. After some time, however, they became uneasy, and tried to drive out the Japanese; and failing in this, tried to make some compromise. Eventually, through the medium of Mr. (now Sir T.) Wade, it was arranged, on 6th November, 1874, that the Chinese should pay 100,000 taels, as compensation to the families of the Japanese subjects who had been killed, and 400,000 taels for roads made by the Japanese soldiers —in all, 500,000 taels.* It was agreed that all the Japanese should leave the island before 20th December, 1874. For the part Sir T. Wade took in these negotiations he received the thanks of the British, Chinese, and Japanese Governments.

In 1862 a Spanish vessel was wrecked on the coast, and the cargo was plundered. The Spaniards are now making a claim for compensation. As negotiations are still proceeding, all the facts have not been made public; but as far as one can judge, the demand seems to be a most preposterous one, as the portion of the island where the vessel was wrecked was, at the time, in open insurrection, and all the officials have been punished; and if the claim was to have been made at all, it should not have been delayed fifteen years.

Much interesting information respecting Formosa may be obtained in the Chinese repository, in a work on the Treaty Ports, by Mr. Mayers, and in the account of a cruise by H.M.S. 'Dwarf,' by Captain Bax.

Having now given an outline of the history of Formosa, it will be convenient to give some account of the Treaty Ports and a few of the more important cities, before proceeding to speak of the present condition and future prospects of the island.

One of the ports first opened to foreigners was Taiwan-fu, the capital of the island. This is a large city, situated about 3 miles from the coast. It contains over 120,000 inhabitants. The walls are about 20 feet high, 12 feet wide, and 6 miles in circuit. Until lately they were in a very wretched condition, but they have now been repaired. Taiwan-fu is the seat of Government of the island. The Taotai of this city is said to have the power of life and death, which is possessed by no other Taotai in China. The port of Taiwan-fu is Amping. This is a small village, situated close to the ruins of the old Dutch fort, Zelandia, the greater part of it being built of bricks from the old walls of the fort. There are barracks here for a considerable number of troops. A new fort has been built in the neighbourhood, armed with heavy breech-loading guns; this fort, unfortunately, I was unable to visit. The custom-house and one foreign-office are situated at Amping, but the foreign hongs are at Taiwan-fu. A creek runs up to Taiwan-fu, so that cargo boats can go right up to the city at high tide. The land between Taiwan-fu and Amping is a mud flat, below the level of extreme high water. This flat is divided into squares by embankments, and there is an embanked road all the way. At certain seasons the sea is admitted to this flat, and allowed to evaporate, for the purpose of collecting the salt. The manufacture of salt is a Government monopoly, and smuggling salt is punishable by the heaviest penalties. The salt supplied in Formosa is wretched, being of a dark grey colour.

---

* There are many different taels in China, and the values of them, compared with English money, are constantly varying. For rough calculations, three Hai Kwan Custom House taels are taken equal to 1*l.*

The harbour, if such it may be called, is only an open roadstead. Vessels anchor in 5 or 6 fathoms 2 miles from the shore. During the N.E. monsoon, *i.e.* from December to March, the roadstead is tolerably well sheltered, and even during November and April there is little to fear. During the S.W. monsoon, however, it is very dangerous.

Close to Amping there is a little deep water; but there is a bar with only 2 or 3 feet of water, and, with the slightest sea, the surf begins to break on it, so that there are often days during which no communication can be held between the shore and the ships. All the trade, consequently, is carried on during the five winter months. Cargo is carried in large boats, but passengers are taken in catamarans. A catamaran consists of twelve bamboos, placed side by side, lashed together with rattans, and small bamboos laid across; two bamboos are lashed a little higher than the others, and to these rowlocks are attached; a square block of wood is lashed near the middle, into which a mast can be stepped. Each catamaran is managed by three men, who row standing, and facing the bow. These catamarans are very safe, and rarely upset on the bar; but they do not venture out in the worst weather. The water, of course, surges up and down between the bamboos, and, in order to keep passengers dry, a tub is lashed on, large enough to hold two people. Fishermen proceed many miles to sea on these apparently frail rafts.

The chief export from Taiwan-fu is sugar. This is grown all over the plain of Formosa, and is crushed in the rude mills of the country. The mill consists of two nearly smooth stone rollers, about 3 feet diam. and 3½ feet high, set vertical and geared together. To the axle of one a long lever is attached, to which two buffaloes are yoked. The cam is fed by hand, and the juice runs through a pipe to a building close by, where it is boiled, passing through from three to six pans, according to the ideas of the owner. The resulting sugar is somewhat dark-coloured, and contains a large quantity of lime, too much being added during manufacture. It is packed in baskets, containing about 2 cwt., and sent to Amping, where it is weighed and re-packed in bags, tied with rattans, each bag containing 1 picul, or 133⅓ lbs. The cane in Formosa is passed twice through the rollers, and each mill crushes enough cane to give, on an average, 15 cwt. of sugar per day.

Another article of export at Taiwan-fu is rattan canes. These grow in large quantities in the island, and are very long and strong, but of a bad colour. They are not considered good enough for putting round tea-boxes, although they are used for sugar-bags. Light-coloured rattans are, therefore, imported from the Straits of Malacca, while dark-coloured and, therefore, cheaper canes are exported to the same place.

About 27 miles to the south of Taiwan-fu lies the port of Takao. Although this port was, as already stated, opened as a dependency of Taiwan-fu, it is now the head-quarters of the Customs staff. The harbour is better than that of Taiwan-fu (indeed, it could hardly be worse); but, as the latter is the capital of the island, ships go there in preference to Takao, when they have a choice. The harbour of Takao consists of a large lagoon, 2 miles long, and 1 to 2 miles wide. The area of water available for large ships is small; indeed, there is hardly room to swing in 3 fathoms, but one or two vessels may lie moored stern and stern. There is a considerable area of 12 feet water. The harbour is capable of improvement. The expense would of course be considerable, as is the case in all harbour works; but the improvement, if properly carried out, would be lasting.

The entrance to the harbour is only 200 feet wide, between steep rocks. The water in the entrance is deep, but outside there is a bar, with 7 to 9 feet water in the centre, and 10 feet at the ends. Large vessels do not, as a rule, come into the harbour, but lie outside, where there is good anchorage in the N.E. monsoon; but the roadstead is dangerous in summer. Immediately to the north of the entrance, Ape Hill is situated. This is a conical hill of coraline stone, 1100 feet high. A good many apes are to be found on it. In the neighbourhood of Takao there are plenty of snipe, but not much other game. The articles of export from Takao are the same as from Taiwan-fu, but less in quantity. In the Customs reports the two ports are treated as one. Lately the British Consul was stationed at Takao; but it is proposed, for the future, that he should live at Taiwan-fu.

In the north of the island the principal port is Tamsui. The real name of the port is Howei, or Hobay, Tamsui being the name of the district of which Teukcham is the principal city. Now, however, the port is known to the Chinese by the name of Tamsui. At the entrance to the harbour there is a bar a mile wide, with only seven or eight feet at low water; vessels, therefore, can only enter at high tide. Inside there is room for several vessels in 12 feet or 15 feet water. The harbour is, on the whole, a good one for its size.

Tamsui is the head-quarters of the Consular and Customs establishments for the north of Formosa. The British Consular offices are situated in the remains of the old Dutch fort, which have been repaired and fitted up for the purpose. About 12 miles up the river is situated the city of Banka, or Meng-ka.

Banka is the largest town in the north of the island, and contains 30,000 inhabitants. Here all the trade of the district is centred. All the merchants interested in the export of tea or camphor, or in the import of opium or piece goods, live in Banka.

Although the foreign settlement is at Tamsui, at the mouth of the river, the British merchants have found it necessary to establish a subsidiary settlement at a place called Twa-ta-tia, about a mile from Banka. Here they have hongs (or combined dwelling houses and offices) and godowns (or warehouses), where tea and camphor are stored, ready to be sent off in cargo-boats, for shipment at Tamsui.

No boat drawing more than 2 feet can go as high as Twa-ta-tia at low water, but there is some deeper water at Banka, and junks go there at high tide. They often ground, however, at low water. The principal articles of export at Tamsui are tea and camphor in foreign ships, and indigo and rice in junks.

Contrary to the practice on the mainland of China, almost all the tea is sold to the foreign merchants, after it has been sun-dried only. The growers sell direct to the foreigners, in small lots, and the taster, after judging of the qualities, mixes those which he considers to be of the same description, and so forms one chop. On the mainland the tea is bought up in small quantities from the growers by Chinese dealers, who fire and mix the tea before selling it to the foreign merchants.

After the Formosan tea has been bought by the foreign merchant, it is fired under foreign supervision. This is done over holes lined with brickwork and filled with charcoal. After the charcoal has burned down, it is covered with ashes, and remains hot for many days. The tea is placed in baskets over the holes, and remains there three or four hours. The firemen are Chinese, who come over from the mainland for the season. The number who come yearly is now over 2000, and is rapidly increasing. The Chinese merchants are anxious to get the firing into their own hands, and are making a hard struggle for it. According to the reports of the customs officials, they have a good chance. Most of the tea is of the description known as Oolong, and goes to the American market.

The construction of tea-boxes is an industry of considerable importance. The wood comes from Foochow, ready cut to size, but the boxes are put together, covered with paper, and lined with lead in Twa-ta-tia. In 1875 300 tons of lead were imported, the whole of which was used for lining tea and camphor-boxes. The tea is packed in chests, half chests, quarter chests, &c. A chest weighs 105 pounds, and contains 90 pounds of tea.

Next in importance to tea comes camphor. This is obtained from the camphor trees near Tokoham. The root of the tree is cut into chips, from which the camphor is distilled. In most cases the remainder of the tree is allowed to lie and rot. In cases where there are any means of transport the tree is sawn into planks, 7 feet long, 2 feet broad, and 1½ to 3 feet thick. These are worth, at Tamsui, about 25c. per cubic foot. The thickness is gradually increasing, because the freight is usually so much per plank. After the camphor is distilled, it is packed in tubs containing about 4 cwt., and sent to Banka or Twa-ta-tia. It has the appearance of slightly dirty snow, and, in the winter of 1875 to 1876, some camphor, largely adulterated with this article, was bought by some Chinese merchants. On arrival at Twa-ta-tia camphor belonging to foreigners is pressed, with a loss of about 20 per cent. in weight. The water which runs from the press contains a certain amount of camphor oil, which is worth a small amount of money. Screw presses have been used up to the present time, but an hydraulic press is now being erected (April, 1877). The Chinese, having no means of pressing, ship the crude camphor in tubs to Hong Kong. The loss of weight in the passage is 30 per cent. The loss in the case of pressed camphor is very trifling, and as the loss in pressing consists chiefly of water, while the loss on the passage represents to a considerable extent a loss of camphor, the advantage of pressing is very great, not to speak of the saving of freight.

A small amount of sugar is exported from Tamsui, but the quantity is very trifling compared with that exported from the south of the island.

Within 8 or 10 miles of Tamsui there are large sulphur springs, which discharge a considerable quantity of sulphur. The incrustations round the springs are gathered and melted in large pans, something like sugar pans. The scum and the sediment are rejected, and the purer portion is ladled into wooden moulds. The blocks thus obtained are remitted in the same way, in order to obtain somewhat purer blocks. The resulting blocks are of a tolerably good colour, but the whole process is very rude, and while it gets rid of a certain amount of impurities, it introduces some others. The system is less wasteful, but less effective, than the Sicilian method of burning in large heaps or calcarone, and much inferior to the processes employed at a few of the best-managed Sicilian mines. The sulphur is worked by the Government solely for the purpose of powder manufacture, and there is little probability of their ever allowing it to be worked for any other purpose, or by any other persons.

Near Tamsui there are some flour mills, the machinery of which is turned by water-wheels. The usual power used for this purpose in China is either manual labour or bullocks.

The neighbourhood of Banka is the chief tea-producing district in Formosa. Tea is grown on the slopes of the hills in small patches. The scenery is very picturesque. The hills are not very high, and the valleys are small, and there is an utter absence of the grandeur of other parts of the island; but the woods and the varied cultivation have a pleasing effect. On the level ground little is grown but rice. This crop requires a great deal of water, and it is a great advantage to get a stream at a sufficiently high level to irrigate the land by gravitation. There is one plain near Banka of 30 or 40 square miles in area, which is irrigated by water from the hills, which are situated at a considerable distance. This water is carried across the river about 4 miles above Banka by an aqueduct. The supply is said never to fail.

Although in this district, as well as in other parts of Formosa, water at a high level is often available, still it not unfrequently happens that more or less extensive areas have to be irrigated from streams below the level of the ground to be flooded. In such cases different expedients are adopted, according to circumstances. The commonest method is the use of a form of chain pump—a trough open along the top is laid at an inclination of about 1 in 2. A wooden endless chain, with paddles attached to fit the trough, is passed over axles at top and bottom of the trough. The bottom of the trough dips into the stream or pool, while the top overhangs the irrigation ditch. The top axle is made to revolve, so as to make the chain with the paddles attached draw the water up the trough. The loss of power through leakage is not very great. The top axle is made to revolve in one of three ways—by cranks turned by hand, by an arrangement like a treadmill turned by the feet, or by a bullock turning a horizontal wheel geared into the axle.

When the water is to be raised from a running stream, advantage is taken of the power of the stream in a very ingenious manner. A large-framed wheel of bamboo is arranged so as to dip into the stream, the current of which makes it revolve. On the rim of the wheel, pieces of bamboo are fixed at a slight angle, each of these is filled with water as it passes through the stream, and as it comes to the top it discharges the water into a trough, which leads to the irrigating canal. These wheels seem to require very little attention. Advantage is also taken of running water to obtain power for hulling rice. This is generally done by hand power or foot power, and is very hard work. Where a stream is available, the hammer is arranged with a bucket at the end of the handle. A small stream of water is brought so as to discharge into this bucket. The handle of the hammer being hung on an axle, the weight of water in the bucket lowers the bucket and raises the hammer, but during this operation the water is discharged and the hammer falls on the rice placed below in a stone bowl.

The Formosans do not appear to make use of the method of raising water in buckets so common in the north of China. A small pool is made, into which the supply of water is led as close as possible to the irrigation canal, *i.e.* the lift is made as nearly vertical as possible. Two men stand at the high level, one on each side of the pool. They have a bucket generally made of close-plaited wicker work, which each holds by two strings, one attached to the rim and one to the bottom. The bucket is lowered to the water, the bottom strings being slightly pulled so as to cant the bucket and fill it with water. It is then lifted by the top strings, and just as it reaches the high level the bottom strings are pulled tight so as to turn the water out. This operation is performed with a quickness which is perfectly astounding.

About halfway between Tamsui and Banka, a river called the Kelung River runs into the Tamsui River. All along the upper portion of this river, as well as on the banks of the upper part of the Tamsui River, there are coal mines worked in a very primitive method by the Chinese; of these more will be said in speaking of Kelung.

A considerable quantity of coal is brought down to Tamsui for supplying the steamers which call at that port, but none is taken there for export.

A few miles up the Kelung River is situated the village of Sak-kow. In 1872 there was a stone there (and, though I did not see it, I believe it still exists), on which there is an inscription to the effect that coal mining is illegal. The change in the views of the mandarins since its erection is very remarkable.. The road between Banka and Kelung follows the valley of the Kelung River. This river has numerous rapids, but it is navigable for boats drawing 1 foot or 18 inches of water. Travellers going from Kelung to Banka generally go in boats, if possible, as it is much quieter and less fatiguing than going by road; but going in the other direction, much time is saved by adopting the road instead of the river. Coming down the river, the boat shoots the rapids; but going up, a pole is lashed across it, and three or four men wade in the stream and push against the pole. At about 20 miles from Banka the river passes within about 3 miles of Kelung, A ridge of hills lies between the river and the village. The road over is very steep, but the height of the summit of the pass is not more than 270 feet.

The last of the treaty ports to be described is Kelung. This is the most northerly of the open ports, and its harbour is the best in the island. It is, however, very small, there being room for only one or two vessels to swing. There is no bar, and there are 7 to 16 fathoms in the entrance, and 4 to 6 inside.

The Junk harbour is of considerable extent, and is close to the village. It is very shallow. It has been ruined by vessels discharging ballast into it. This practice is now forbidden, but it is not altogether stopped. The harbour is well sheltered from all winds except the north. The entrance is marked by an island, called Kelung Island, 580 feet high which forms a conspicuous object from the sea. There is deep water all round it. The harbour is very beautiful. Vegetation reaches to the water edge, and the hills are pretty wooded. There are numerous palms, and tree-ferns abound in the neighbourhood. There is a small island, called Palm Island, which shelters the harbour to a great extent. If a breakwater was built out from the western shore, opposite Palm Island, and some portions of the bay dredged, it would make the harbour a safe one in all weathers. This would cost money, but it would be a permanent improvement.

The rainfall at Kelung is large. In 1874 it amounted to 120 inches.

About 4 miles from Kelung there is a bay called Petaou Bay, or Coal Harbour. It derives the latter name from the fact of there being abundance of coal in the neighbourhood. It is a small but tolerably well-sheltered harbour. There is room for one or two small vessels, but there is no room for a large vessel to swing.

Between Kelung and Coal Harbour there are some very curious rocks, called the image rocks. These are comparatively soft rocks, with nodules of harder rocks imbedded in them. The sea has eaten away much of the soft rock, leaving the hard nodules projecting, and giving rise to most fantastic forms.

Coal has been worked in this district for a very long period by the Chinese. Their mines consist of little more than holes in the ground at the outcrop of the coal seam. The seam is followed as long as the mine can be kept dry. Arrangements are made for keeping the surface-water from running into the mine, and occasionally a wooden chain pump, like that used for irrigation, is employed to drain the mine, but it is practically correct to say that no pumping is employed, and wherever such is necessary the mine is abandoned. In one valley, near Kelung, there are said to be sixty such mines opened, and the number in the district is so great that 45,000 tons were shipped in foreign ships in 1873. This is the largest export as yet.

All vessels at present which come for coal lie in Kelung Harbour, the coal being carried to the water edge in baskets, and then shipped in cargo boats, which take it to the ship. Some of the coal has to be carried over the hills. Many children are employed in this work, which appears to be very hard.

Some time ago the provincial authorities determined to sink some pits and work the coal under foreign supervision. They engaged an English mining engineer, a Mr. Tyzac, who spent great part of 1875 in examining the district. Having determined on the proper course of procedure, he returned to England, and in May 1876, he despatched a party of eleven men, consisting of sinkers, miners, engineers, carpenters, and a blacksmith. All these were picked men, capable of superintending work in their several departments. A full supply of winding and pumping machinery, and everything necessary to start the work fairly, was sent out at the same time.

In April 1877, a shaft 250 feet deep, and 12 feet 7 inches in diameter, had been sunk, and was then within 50 feet of a bed of coal 3 feet thick, lying at an inclination of 1 in 6. No water to speak of had been met with. The pit is being lined with sandstone of good quality, and all the permanent work and materials appear to be of the best description. The guides for the cage are of the new pattern, viz. vignoles rails to run at one side only. To all appearance there is more risk of a cage catching with guides of this pattern than with the old-fashioned wooden guides, but those supplied are good heavy rails, and, if well fitted up, will no doubt work well.

The mine is situated about 1⅓ mile from the coast, at an elevation of 150 feet above the sea level. A temporary tramway has been laid to the shore. The engines and machinery are capable of lifting 700 tons per day. Native workmen have been employed as sinkers at 30 cents per shift of eight hours, and have turned out well. The natives have also been trained to blast in the quarries without the presence of foreigners.

The Kelung coal is highly bituminous, and rather soft. It is a good steaming coal, in the sense that if employed there is no difficulty in keeping up steam, but it burns very fast, and a large quantity is required for a given amount of work. It is, therefore, unsuitable for steamers going long voyages. The smoke is very dense, and this is a drawback; and it is no uncommon thing to see flames rising several feet out of the funnel of a steamer. It is probable that the coal raised from the pit will be better than that mined at the outcrop, and there is little doubt that there will be a ready sale for all that can be raised. When it was determined to work the coal under foreign superintendence, a proclamation was issued saying that it was not intended to interfere with the working of the present mines, provided they did not encroach on the space set apart for scientific working.

Until lately the export duty on coal was 0·7 H.K. taels, say 4s. 6d. per ton; it has now been reduced to 0·07 H.K. taels, or one-tenth of the old amount. Including some local charges, the total dues payable on coal for export do not exceed 7d. per ton, an amount which brings some return to the revenue, and does not interfere with the trade.

Near Kelung, clay ironstone is found, but of very inferior quality.

There is a memorial-stone in Kelung erected to the memory of those who perished at the wreck of the 'Laptek.' This was a very distressing occurrence. The 'Laptek,' a British vessel, ran on shore about 8 miles from Kelung in 1874. All attempts to get her off having failed, she was surrendered to the underwriters, and Mr. Greig, Lloyd's agent, went to take charge. A lieutenant and several men from H.B.M.S. 'Kestrel' went on board to assist in dismantling. The work went smoothly for a long time, all on board having a pleasant time of it; indeed, it was described by one who assisted as being more like a prolonged picnic than like work. When the work was nearly finished, on 17th July, a severe storm rose suddenly, and Mr. Greig, the lieutenant of the 'Kestrel,' and six men were drowned.

In addition to the Treaty ports there are several native ports, but there is not much known about them. One of the best is Saw-o Bay, on the east coast. This is a tolerably well-sheltered port, with fair anchorage. The village is inhabited by Chinese fishermen. Twelve miles to the north of Taiwan-fu is situated the port of Kok-si-kou. This is a good port; but there is no inducement for foreign vessels to go there, even if the port was opened.

The port of Heong San, near Teuk Cham, is sheltered by sandbanks, but the water is shallow.

The Treaty ports of Formosa are points of such special interest that it appeared advisable to devote considerable space to a description of them; but there are several other cities and towns in various parts of the island which deserve notice.

The island may be divided, either according to its physical character or according to its inhabitants; but, practically, it makes little difference which method is adopted, because, roughly speaking, the flat portion is civilised, while the mountainous portion is savage.

Immediately to the north of Taiwan-fu, the country is sandy and slightly undulating. By degrees, as one goes north, the soil becomes richer; but for 20 miles the land is very poor, and badly cultivated. After this it improves quickly, and, before Kagee is reached, the land through which the road passes becomes rich and highly cultivated, producing rice, sugar, sweet potato, beans, betel-nuts, bananas, &c.

Very great attention has been paid to irrigation from this point right up to the north of the island, wherever the ground is at all suited to it. In many places the water has to be pumped, but in most places it has been brought from the higher ground in embanked canals; and wherever there are streams at a sufficiently high level, they have been trained, and have had weirs built across them so as to suit them for irrigation. Some of these weirs are considerable works.

Kagee, called Chin-lo-san by the natives, is a walled city of considerable importance. Paper is manufactured in the district, and the city is a centre of trade for the surrounding country. About 20 miles south of Kagee there is a small volcano, which has been seen by the missionaries. There is flame, but no smoke, issuing from the crater.

North of Kagee there are several rivers intersecting the rich alluvial plain. The first of any importance is the Boekhe, which runs about 20 miles north of Kagee. The bed of the river is composed of sand and gravel. It is very small in dry weather, but in floods it is a swift and wide torrent. It overflows the adjacent country sometimes to the extent of 1 mile in width.

A short distance to the north of this there are three rivers, the Chu-a-khe, the Twa-sin-tsung-khe, and the Potau-a-khe. The description of the Boekhe applies exactly to these rivers, except as to width. The flood bed of the first is 1½ mile wide; of the second, half-a-mile, and of the third, 1¾ mile. Included in these widths there are banks of sand and gravel, which may not be covered during floods, but they are merely composed of *débris* washed down by the stream, and are liable to be carried away at any moment.

After passing the Potau-a-khe, the road passes through very rich and carefully-irrigated rice lands, until Chang-hwa is reached. This is the second city in the island; but almost all the trade is carried on with the coast ports, which are not open to foreigners. Not only is there no trade between Chang-hwa and Taiwan-fu in foreign hands, but, as far as I could discover, there is no trade in native hands. Chang-hwa is a walled city, of apparently 60,000 or 80,000 inhabitants; and judging from its busy appearance, the trade which it has with the coast ports must be very large. Very good bricks and tiles are made in the vicinity.

A few miles south of Chang-hwa there are signs of the ancient beds of mountain torrents, large quantities of gravel having been washed down into the plain. North of Chang-hwa there is more rice ground, through which runs the River Toa-to-khe, and one or two smaller streams. The hills to the north of this river approach much nearer the coast than the hills further south, and the road which to the south runs entirely in the plain, occasionally runs some little distance up the hills. The lower portion of the hills are being gradually brought into cultivation, and large quantities of rice are grown, but I saw no sugar in this part of the island.

About 20 miles north of Chang-hwa runs the Tyka-khe. This appears to be the swiftest of the Formosan mountain torrents. In the dry season it consists of a number of small streams, winding through banks of large shingle. At the time I crossed, all but one of these could be forded, but some of them were so swift that it was unsafe for one man to cross alone. Judging from the size of the stones, the river must be very fierce in floods, and the width of the bed liable to floods is 2 miles. Immediately to the north is the town of Tyka. Most of the trade of this place is carried on with the coast, but a little is carried on with Banka and the northern ports. Very fine grass mats are made here. A small trade is done in the second quality, but the very finest do not get into the market. They are about 6 feet by 4 feet, and are nearly waterproof. Immediately to the north runs the Pang-le-khe. This is a collection of mountain streams, all crossing from one gorge in the mountains. The beds of all are constantly changing. The width from the most southerly stream to the most northern is about 5 miles, and all the land between is liable to floods. There is a piece of land in the middle about half-a-mile wide which is cultivated, but it is composed of *débris* brought down by the streams, and though it has not been covered lately, it is liable to be eaten away by the rivers and re-deposited in some other place. The stones in the river are not so large as in the Tyka River, but the stream is very rapid in floods. And these rivers which have been described form great obstacles to the internal trade of the island. Travellers are often stopped for days, and, occasionally, I believe, for weeks.

The rainy season in the north of the island is in winter; and near Taiwan-fu, in summer; consequently, any one making the through journey is liable to be stopped somewhere. The best time for travelling seems to be October and November, and again in April.

North of Tyka, many of the villages are fishing villages. The hills come near the coast, and the cultivated land is broken up. Twenty miles to the north of Tyka is Oulan, a walled city, on the banks of a river, navigable by junks drawing little water. Near Oulan there is a desert of shifting sand, but it is of small extent. About 20 miles further north, Teuk Cham is reached. This is a walled city, of at least 50,000 inhabitants, and is the seat of Government of the Northern Provinces. Bullock carts can go from Teuk Cham to near Tamsui, and also to the native port of Heong San, a distance of 4 miles.

The sugar grown near Teuk Cham is considered to be good, but most of it must be exported in junks. Teuk Cham is also noted for its oil, made from the pea nut. This oil is largely used all over China, and burns brilliantly. It is by many considered superior to Colza.

North of Teuk Cham the road passes over some high downs. Much of the land is uncultivated, but, where water can be obtained, there rice is grown.

About 20 miles to the north of Teuk Cham lies Tien-lick, a large town, and a distributing centre for the surrounding country. There is a very large carrying trade between this city and Banka. About 10 miles north, the highest point on the road is reached, at a village called Gu-lu-na, after which there is a rapid descent into the valley of the Tokoham River, at a village called Sin Ching. This village is noted for its rice or pith paper. This paper is cut from the pith of the *Aralia papyrifera.* The pith is cut round and round, and the paper is wetted and pressed flat. The paper is exported principally to Canton.

About 3 miles below Sin Ching the Tokoham River joins the Tamsui River near Banka, the neighbourhood of which has been already described.

James Morrison.

(To be continued.)

THE CROZET ISLANDS.

(South Indian Ocean.)

Captain Lindesay Brine, R.N., has made the following interesting Report on the Crozet Islands, in lat. 37° 9′ S., and lon. 150° 57′ E., which he visited when in command of H.M.S. 'Wolverene' in 1876:—

"We left Simons Bay on 18th November, and proceeded to the south until we fell in with the prevailing westerly winds in latitude 38° south, longitude 18° east. We then steered straight for the Crozet Islands until we reached latitude 43° 26′ south, longitude 36° 10′ east, the islands then being 622 miles distant. We now entered a dense fog, which continued, with rare intervals of open sky, until the morning of the 30th, at which time we had nearly run our estimated distance.

"We were on the point of heaving to, to wait for the weather to clear, when a sudden lift of mist disclosed for a few minutes the west end of the Twelve Apostles about three miles off on the bow.

"This point of the island is remarkable for its lofty group of pinnacle rocks closely resembling the Needles. These, although attached by their base to the island, appeared when first seen like sharp, jagged peaks, arising separately from the sea, and it was the low morning light penetrating between the open spaces that caused them to stand out so clearly. The island itself was not visible. A high rolling sea broke heavily on the weather shore.

"At about 9 of the forenoon the fog again lifted, and I steamed in for the land, to examine the Twelve Apostles (the island on which the 'Strathmore' was wrecked), firing guns to attract attention.

"It was evident that no close observation could be made unless a change took place in the weather; but most fortunately the fog cleared away, and was succeeded by two singularly fine and calm days, and we were thus able to examine the shores, bays, and hill slopes within a distance from which any people or signs of wreck could have been distinctly seen.

"A small cairn, raised by the survivors from the 'Strathmore,' still exists at a point on the ridge about 300 feet above the sea. A grassy plateau where they were encamped was covered with white albatrosses sitting on their nests, and the rocks were crowded with penguins. Seabirds of various kinds were numerous, attracted by a good stream of fresh water, which flows from the hill over the cliff into the sea.

"After completing the examination of the Twelve Apostles, I steamed across to Hog Island, and examined its leeward coast. Here, as at the Twelve Apostles, the valleys and hillsides were dotted with white albatrosses.

"The top of this island was covered with snow, and, although it was now the summer of these latitudes, large quantities of snow were still lying in the cleft of the rocks near the shore. The windward or west side of the Hog Island is precipitous and much exposed, and I did not see any places where wrecked people could settle, but upon its lee or eastern slope there were several fairly-sheltered positions, where the landing would not be difficult. The lower sides of the hills are covered with coarse grass. There are numerous birds and rabbits and several fresh-water streams.

"I now proceeded to Penguin Island, the southern extremity of the Crozet group. This is a bare precipitous rock about 4½ miles in circumference. I could not see any water here, and very few birds.

"This volcanic island appears to be destitute of any means of preserving life, and unfortunately it is, from its position, the most dangerous for vessels proceeding by a great circle route to Australia.

"The search round the shores of the Windward Islands occupied one day, and the next was employed in a similar manner examining the Eastern Islands.

"The first visited was Possession Island, the largest and most important of the group. When off Nairne Bay we observed on the beach a hut, several casks, and two boats, one of which seemed to be in fair condition. The sea being smooth and the wind light, I decided to anchor, and send in our boats to search the shore, as I thought it probable we should find some record left by people who might have gone there in the hope of meeting a sealing vessel.

"Upon landing, our attention was immediately excited by the strange sensation of finding ourselves surrounded by animals which evidently had not the slightest fear of men or their guns. Hundreds of seals, which were resting on the damp grass bordering on the stream, which at this point enters the sea, made no attempt to escape from us; the albatrosses, also, would not move from their nests on the ground. These magnificent birds, measuring in several instances 11 feet across the wings, only showed resistance when actually seized, and even then did not seem to have any sense of danger. The bay was alive with birds; we observed the white and sooty albatross, peterels of various kinds, black hens and cape pigeons, numerous gulls, and a few wild ducks, and the rocks were covered with seals and penguins.

"The hut was about 12 feet long, and contained six sleeping bunks; it was rudely constructed with staves of casks. There was a stove inside, on the right of the door, ingeniously made out of an old fish kettle; the funnel was formed by a series of small iron hoops, nailed together. There were a number of empty casks outside, together with other *débris* belonging to a sealing establishment. There were two whale boats hauled up on the beach. One of these was useless; the other, with some slight repairs, could be made seaworthy. The name, 'J. A. Brink,' was cut on the door of the hut. We found no document, or any signs of the bay having been lately visited. The following record was placed in a tin box, and secured to the stove in the hut:—'Her Brittannic Majesty's ship, 'Wolverene,' 17 guns, visited each island of the Crozet group, to ascertain if there were any shipwrecked people on them, and finally called at this bay on the 1st December 1876, on her way to Perth, Western Australia, from England.'

"We concluded our examination by steaming round and searching the steep and desolate shores of East Island, the last of the group.

"Soon after leaving the land, and while the Crozets were still visible, we passed close to a large iceberg, whose height was estimated at 300 feet, and the circumference at the water line about 3 miles.

"Judging from my experience, I would submit that merchants' vessels should be cautioned against going down to a higher latitude than the 44th parallel; in the stormy latitudes south of this the westerly gales propel a ship through the water at a great speed, and the seas are so high that it would be difficult to check the speed or haul to the wind to clear danger. The Crozets are in a known position and can be avoided by careful navigation, but this is not the case with icebergs; if one of these should happen to be floating in the line of course of a vessel going through the water at a rate of 12 or 13 knots during a fog by day or on a dark night, it would not be seen until it was too near to be avoided and destruction would be certain. Icebergs in these southern seas should be considered as representing rocks or shoals in unknown positions. Merchant ships rushing blindly through these dangers run most criminal risks, they play a daring game of chance at which the lives of the passengers and crews are hazarded. It is more than probable that the majority of the ships reported as missing in these seas are missing because wrecked by sudden and violent contact with drifting icebergs.

"In the event of people being cast away on the Crozets I would recommend that, if possible, they should establish a look-out place on the Twelve Apostles; this island is the one which would most probably be sighted by ships, and an object placed or a man standing on the ridge where the 'Strathmore' cairn is erected would be seen at a great distance.

"The north-east point of the Twelve Apostles is by the chart placed in longitude 50° 41′ east. Our chronometers placed the point in longitude 50° 36′ east. This is assuming the latitude to be correct, as no observations for latitude could be obtained. If our longitude is correct the Twelve Apostles should therefore be placed five miles west of their present position on the chart."

Reviews.

—:o:—

SOME SCIENTIFIC RESULTS OF THE ARCTIC EXPEDITION.[*]

THE important scientific results of the Arctic Expedition are still being worked out, and will appear with the work of Sir George Nares. Captain Feilden is engaged upon the natural history, Staff-Commander Creak on the magnetic work, Lieutenant Egerton on the meteorology, while observations on currents, tides, and winds are being worked up by Sir George himself. But, in the meantime, a few instalments have been published. In our number for August 1877, we noticed Captain Feilden's interesting paper on the birds of the North Polar Basin. His paper on the mammalia of North Greenland and Grinnell Land is now before us.

Captain Feilden, who received cordial assistance from every officer in the Expedition, is confident that no species of mammal escaped their united observation.

In the present paper there is, first, a notice of each point where remains of Eskimo were discovered. The most northern position was close under Cape Beechey, about 6 miles south of the 82nd parallel. The traces here found are, indeed, the most northern vestiges of man. They consisted of the frame-work of a large wooden sledge, a stone lamp, and a snow scraper, made out of a walrus tusk. Cape Beechey is at the narrowest part of Robeson Channel, where it is not more than 13 miles across; and the 'Polaris' Expedition found traces of summer encampments a few miles to the south, on the opposite shore, near Cape Lupton. Captain Feilden, therefore, conjectures that this was the *Ultima Thule* of Eskimo advance, and the point of crossing the strait. Northwards from Cape Beechey no trace of man was discovered. This is three degrees north of the present extreme range of the Etah Eskimo, the most northern race of men known; and the traces, not only of wanderings, but of former permanent habitation, were found in places where, under present climatic conditions, it would be impossible for even the "Arctic Highlanders" now to exist.

All traces of man ceased before reaching the 82nd parallel. For the same reason no bears ever enter the Palæocrystic Sea through Robeson Channel. Captain Markham found the skull of a large bear in 82° 30′ N., but it was probably washed out of mud beds, which fill up the valleys of Grant Land, and may have been brought on the ice from any distance.

Commander Beaumont secured an ermine (*Mustela erminea*) during his sledge journey, in 82° 15′ N., and specimens were obtained in Grant Land as far north as 82° 30′ N., where it is hunted and killed by the Arctic fox. On the 1st of April, 1876 several wolves (*Canis lupus*) made their appearance in the neighbourhood of the winter quarters of the 'Alert,' following a small herd of musk oxen. They are larger than the largest of the Eskimo dogs, of a light grey colour, with long fur and drooping tail. At intervals the long, melancholy, but not unmusical wail of these wolves reverberated from the hills. On the 25th of May a solitary wolf appeared and followed Captain Feilden's sledge, for several days, but it was very cunning, and eluded all endeavours to get a shot at it. The foxes (*Vulpes lagopus*) were very scarce. There were occasional footprints, but no fox was seen until the 13th of July, when two were secured by Captain Feilden and Commander Parr, on a plateau 800 feet above the sea. They were both in summer garb, the hair on the back and brush being of a dirty rufous tinge. On further examination, the explorers found many dead lemmings and two ermines, as well as numerous *cachés* of dead lemmings, evidently made by the foxes; and obviously depôts for the winter. The increased vegetation (*Saxifraga*, *Stellaria*, *Draba*, *Potentilla*) induced by the presence of the foxes is the means of attracting and sustaining the lemmings in the immediate vicinity of the foxes' dens. The lemming (*Myodes torquatus*) was found in great abundance up to the extreme northern point of land attained in 83° N. Their southern range appears to be stopped by the great Humboldt glacier. Their food consists of buds of *Saxifraga oppositifolia* and other herbs, and they make nests of grass in the snow; but Captain Feilden is not of opinion that they hibernate. He gives a very interesting account of their habits, and of the formation of their claws. The hare (*Lepus glacialis*) was met with in small numbers, and Captain Markham found its footprints nearly 20 miles from the land, in 83° 10′ N.

Captain Feilden's remarks on the history and migrations of the musk ox (*Ovibos moschatus*) are extremely interesting. Only six were procured round the winter-quarters of the 'Alert,' and their range is confined to the coast-line and adjacent valleys. It is extraordinary how they obtain food during the long Arctic night; but it is certain that they remain on those desolate shores throughout the year, although the number in Grant Land is extremely limited. No reindeer were seen.

The ringed seal (*Phoca hispida*) is the only species met with north of Cape Union, and which penetrates into the Palæocrystic Sea. Lieutenant Aldrich saw one near Cape Joseph Henry, and Captain Feilden obtained another in September 1875. Three or four were also seen in the following June, and as it would have been impossible, owing to the closely-packed state of the ice, for any seal to have worked its way to the inlet where they were seen, Captain Feilden is satisfied that the *Phoca hispida* is resident throughout the year on this coast, in very small numbers. The stomach contained remains of crustaceans and annelids. The *Phoca barbata* was shot in Robeson Channel, but was not seen to the northward; and the walrus (*Trichechus rosmarus*) does not go north of the meeting of the Baffin Bay and Polar tides off Cape Fraser. No whale could inhabit the frozen sea to the north of

---

[*] *The Mammalia of North Greenland and Grinnell Land.* By H. W. Feilden, F.R.G.S. (*Zoologist*, Aug. and Sept. 1877).

Recent or Living Mollusca brought home by the Naturalists of the Arctic Expedition. A list, by Edgar Smith. (*Annals and Mag. of Nat. Hist.*, Aug. 1877).

List of Crustacea collected by the Arctic Expedition. Mr. Myers. (*Annals and Mag. of Nat. Hist.*, July and Aug. 1877).

"*The Post-Tertiary Fossils procured by the late Arctic Expedition, with Notes on some of the Recent or Living Mollusca from the same Expedition.* By J. Gwyn Jeffreys, LL.D., F.R.S. (*Annals and Mag. of Nat. Hist.*, Sept. 1877).

Arctic Molluscan Fauna, by Captain Feilden, F.R.G.S. (*Zoologist*, Oct. 1877).

Robeson Channel. The mammals of the land bordering on the Palæocrystic Sea are :—

1. Ermine (*Mustela erminea*).
2. Wolf (*Canis lupus*).
3. Fox (*Vulpes lagopus*).
4. Lemming (*Myodes torquatus*).
5. Hare (*Lepus glacialis*).
6. Musk Ox (*Ovibos moschatus*).
7. Ringed Seal (*Phoca hispida*).

There are some remarks in the papers by Mr. Smith and Mr. Gwyn Jeffreys which require notice, as they may lead to erroneous notions respecting the biology of the Palæocrystic Sea. Mr. Smith says :—"It is somewhat disappointing, considering that unexplored regions were searched, that only a single new form was procured. The entire collection consists of thirty-four species. This may appear a very small number; but the difficulty experienced in collecting in such northern climates in a great measure accounts for such small results. It by no means proves that there is any great scarcity of molluscan life in the regions investigated. In all probability further research will discover many more known forms, thus showing that the fauna northward does not change very materially from that existing further south in Davis Strait." Dr. Gwyn Jeffreys writes :—"I cannot help sharing Mr. Smith's expression of disappointment with the conchological results of the Expedition. The number of post-tertiary as well as of recent species is very scanty. In analogous or apparently similar cases of so-called 'glacial' and raised sea-beds in Great Britain, Scandinavia, and Canada, which I have examined, I collected in two or three hours a greater number of fossil species than those procured in the Expedition."

Mr. Gwyn Jeffreys further says that marine animals, especially of the invertebrate kind, abound in the Polar Ocean as far north as it has been explored. He alludes, in proof of this, to Captain Markham having brought up a few crustaceans on a lead line in 83° 19′ N., and to ducks and geese flying towards the N.W. from the 'Alert's' winter-quarters, adding, "it must be recollected, that these ducks and geese subsist entirely on marine animals;" and he thus concludes: "I am therefore at a loss to know upon what grounds Sir Rutherford Alcock, the President of the Royal Geographical Society, stated in his address on the 28th of last May, as a fact, that animal marine life almost ceases to exist in the ice-covered Polar Sea, and the Palæocrystic Sea is a sea of solitude."

Sir Rutherford Alcock was delivering a general address on geographical subjects, and he alluded mainly to vertebrate life. His statement was perfectly accurate. With the exception of a snow bunting, which had strayed from the land, not a single living thing was seen on the Palæocrystic Sea outside the floebergs. Four seals *(Phoca hispida)* were seen in the bays on the coast, where they had remained throughout the year, and the ducks and geese, alluded to by Mr. Gwyn Jeffreys, were not flying north over the sea, but along the land. Their course was N.W. from the winter-quarters, simply because the land trended in that direction, but it afterwards trends S.W., and the real destination of the birds was south and not north. They do not subsist entirely on marine animals, but almost entirely on food obtained in fresh-water pools and lakes.

As Sir Rutherford Alcock correctly said, the Palæocrystic Sea is a sea of solitude. All traces of human beings cease before it is reached, at 81° 54′ N. There are no bears, no cetaceans, no seals—except the few individuals seen within the line of hummocks—no falcons, no birds, except close along the land. This total absence of the vertebrates is one proof that invertebrate life also becomes very scant in the frozen Polar Sea. But the proofs are cumulative, as will presently be shown.

Mr. Gwyn Jeffreys and Mr. Smith attribute the small number of species brought home to the difficulty in collecting in such northern climates. This is a mistake. The remarkable energy and perseverance of the collectors is proved by the great number of specimens (as distinguished from species) that was brought home, and the collectors were not, as is suggested, labouring under disadvantageous circumstances. It is true that the ice prevented dredging to any extent; but Captain Feilden and his colleagues had the great advantage of being able to examine recent sea beds extending from the present sea-margin to a height of no less than 1000 feet; and beds are being deposited at the present day under precisely the same physical conditions as those now elevated above the sea level. Thus the molluscan fauna of the past, represented by these post-tertiary deposits, is precisely that now existing in the adjacent sea. At least forty or fifty spots, where these beds occur, were carefully examined by independent observers, especially by Captain Feilden, Mr. Hart, Dr. Moss, Lieutenant Parr, and Lieutenant Egerton. The work of collecting the invertebrate fauna of the newly-discovered region was thus performed thoroughly and exhaustively. The sands and mud were also frequently submitted to microscopic investigation.

The results, as given in the *Zoologist* by Captain Feilden, are that four species of *Conchifera* were found to be very generally distributed as fossil forms, and in considerable numbers, namely, *Pecten Grœnlandicus*, *Astarte borealis*, *Saxicava rugosa*, and *Mya truncata*. The *Gastropoda* are excessively rare in a fossil form, and the dredgings showed that a similar disproportion existed in the number of individuals between the recent *Conchifera* and *Gastropoda*.

Thus the molluscan fauna was examined under very favourable circumstances, owing to these large deposits of recently-emerged sea-beds being laid open to the investigations of intelligent and most diligent collectors—the result showing a remarkable correspondence between their fauna and that of the neighbouring sea. The two combined show very accurately the present condition of the molluscan fauna from Smith Sound up to the 83rd parallel.

Such is one out of many valuable scientific results of this admirably-conducted and most successful Expedition.

Mr. Gwyn Jeffreys says that he has collected in the raised sea-beds of Great Britain, Scandinavia, and Canada, in two or three hours, a greater number of *species* (not specimens) than those procured in the Expedition. No doubt Captain Feilden has not unfrequently done the same; but neither Mr. Gwyn Jeffreys nor any other man living could have collected more carefully, or more successfully, than was done by the members of the Expedition at the sea-beds discovered by them. More species were not collected for the very obvious reason that they do not exist.

The reason of their absence is, of course, the absence of suitable food, as Captain Feilden points out. The four species of *Conchifera* already mentioned as being numerous, subsist on diatoms, which are abundant in polar waters. A supply of suitable food is not forthcoming for the support of the *Siphonostomata*, and hence their absence. The Davis Strait tide is met by the colder tidal water from the north, at Cape Fraser, and this is an explanation of the fact that the more abundant Davis Strait fauna does not extend into the Palæocrystic Sea. The bottom temperature of the water in Davis Strait is from 34° to 36°, while the strong southerly glacial current which the Davis Strait tide meets off Cape Fraser has a temperature of 29°. The decrease of invertebrate animal life is shown by comparing the number of species of recent *mollusca* collected by different expeditions. The 'Valorous,' from 60° to 70° N. lat., obtained 122 species; the 'Assistance,' from 75° to 77° N., 45 species; Dr. Hayes, near the entrance of Smith Sound, 21 species; and the late Arctic Expedition, from 79° to 82° 30′, only 35 species. The facts conclusively prove that the collections made by the Arctic Expedition fairly represent the molluscan fauna from 79° to 83° N. Those collections reflect the highest credit on the accomplished naturalists and their zealous colleagues and fellow-workers, who, for the first time, have furnished us with a satisfactory knowledge of the fauna and flora of a hitherto unknown region. The notices that have hitherto appeared are, however, merely instalments of the rich and varied results of the Arctic Expedition which will shortly be published.

BARON RICHTHOFEN'S CHINA.[*]

The appearance of the first volume of the work in which Baron Richthofen has recorded the results of his extensive researches in China, has created quite a sensation in the scientific world. No one certainly was better qualified to approach the task than one whom that high authority, Colonel Yule, has described as "a traveller who has not only trodden many hundreds of miles in the footsteps of Marco Polo, but has, perhaps, travelled over more of the interior of China than Marco ever did, and who carried to that survey high scientific attainments, of which the Venetian had not even a rudimentary conception."

Baron Richthofen returned to Europe in December 1872, after an absence of twelve years, four of which he had spent entirely in China and Japan, having traversed the former country from Canton to the southern verge of Mongolia, and from Shanghai to Ching-tu, and having personally visited fourteen out of the eighteen provinces into which the country is divided. The little that has hitherto been published respecting these journeys has appeared in some geographical journals (notably *Petermann's Mittheilungen*), in the shape of letters originally addressed by the Baron to the Shanghai Chamber of Commerce. These few letters, however, were important enough to show that Richthofen's researches had thrown an entirely new light on many points of considerable interest, such, for instance, as the coal deposits of Shan-si, the distribution and characteristics of the *loess* formation in North-west China, and the "red basin" in Sz-chuen. Up to the present time, Richthofen has come before us more as a geologist than ought else. Those who now take the book in hand will probably be led to expect a physical sketch of the one and a quarter million of square miles and upwards constituting China proper, since the title excludes all idea of a mere record of travel. The title is "Experiences of Travel and the Result of Researches based thereon;" but a glance at the work will show that it is not a mere description of the geology of China, with treatises on the economical features of the country, and the distribution of products. We must express our opinion that it is a record of researches in the most varied sense of the word, which combine to place the author in the first rank of geographers.

When we begin to examine the subject of Baron Richthofen's volume, we are struck with the want of a reliable work which could form a basis or introductory study to the present book, and which would enable a student to appreciate the true position of a country which owns one-quarter of the population of the entire globe. Geographical literature on the subject of Asia in general was still influenced by certain old theories from which even Carl Ritter, one of the foremost of the new school of geographers, was unable to emancipate it. We refer more especially to the division of the continent into Hither and Further Asia, or Eastern and Western Asia. Another peculiarity worthy of note is that in Ritter's work fourteen volumes are devoted to Iran, Asia Minor, Syria, and Arabia, while only six deal with Northern, Eastern, and Southern Asia. China appears here as a region of comparatively secondary interest, equivalent about to Asia Minor in importance, while, in reality, the two are wholly incomparable. Humboldt's work on Central Asia is another of acknowledged authority, but it is generally held that he has restricted his view of Central Asia too much to the region between the Altai and the Pamir, where he would locate his meridional Bolor Range, and that this knot or boss in the mountain regions of Asia bears a disproportionate relation to the general mass of the continent. Humboldt's work appeared in 1843, and the volumes of Ritter, with which we are concerned, in 1832-4. The axis of the continent has since then, thanks to the gradual exploration of the eastern lands, been placed by unanimous consent further eastward, and the older views of geographers have become obsolete, just as Buffon's school of zoology has had to give way to that of Cuvier.

Richthofen's opening chapter justifies us in ranking him as the Cuvier of geography, in reference to his description of the Asiatic system, for his exposition thereof differs materially from that of Humboldt. The true view of the Central Asian system, as contrasted with the periphery of the continent, can be realised from a consideration of it with reference to so important a portion as China. It is also an excellent feature of the work that these new theories on the continuity of the great Central Asian plateau from the Pamir to the Khingan Range are only indicated in their leading features, so that the author does not lose his point or the thread of his argument in side issues.

---

[*] *China. Ergebnisse eigener Reisen und darauf gegründeten Studien von Ferdinand Freiherrn von Richthofen. Erster Band. Einleitender Theil. Mit 29 Holzschnitten und 11 Karten.* Berlin, Verlag von Dietrich Reimer (London, Trübner & Co.), 1877.

We can only touch but sparingly on the contents of the work. The characteristic feature of Central Asia is the great plateau, which the author describes as the former bed of a huge inland sea. He applies the Chinese name *Han-hai*, or dried-up sea, to the entire region, which has hitherto borne no common name in European geographical literature, but which has been called by the names of Eastern Turkistan, or the Tarim basin, in its western, and Gobi, Shamo, or Mongolia in its eastern portion. The Han-hai, with its enclosing ranges, forms one of the largest regions without any outlet to the sea in existence, and the author shows graphically what influence such conditions of land-formation exercise upon the inhabitants. The chief difference between those countries the drainage of which collects in rivers which reach the sea, and those where the drainage collects in inland lakes and evaporates, is that in the latter the *loess*-like particles left are unsuitable for agricultural operations, and that only nomads can find there a subsistence. These regions are also peculiarly exposed to the operation of the wind, which is an important geological agency. The author shows how the Tien-shan and Kuen-Lun Ranges help to contribute in this way towards the repletion of the intervening basin. The valleys are first filled up, and the levelling tendency of the wind causes the same steppe-like appearance in the depressions of the plateau, which are barely 2000 feet above the level of the sea, and on the ridges of the Kuen-Lun, which range between 15,000 and 20,000 feet in height. A chief feature of this region without outlet is a dry climate. Where great downpours occur, brooks unite, and form lakes, which at last burst their banks, when the downfall exceeds the loss by evaporation. Out of these are formed, first, isolated lakes, and then chains of lakes, which change into rivers, and so reach the sea. According to Baron Richthofen's view, in ancient times the salt-steppe in Central Asia was of much greater extent, and included all North-western China. A change in the climate has led to the formation of the Hoang-ho river system, and, in this wise, a land formerly devoted to nomadic pursuits has now been changed into one of great fertility. Into the appearance of this *loess* country, in Northern China, we do not propose to enter, as previous publications have enlarged on this topic. He gives, however, fresh proofs in support of his opinion, and illustrates the parts referred to by some excellent woodcuts.

But Richthofen does not dwell exclusively on these geological matters. When we speak of him as a geographer, we imply that for one thing he continually endeavours to consider the structure of the country with reference to the history of the people, their civilisation, emigration, and social and political movements. He shows very clearly that Dzungaria on the one hand, and the narrow pass of the Yumonn on the other, which lead towards Lan-chau-fu on the Hoang-ho, were the two gates by which the Steppe population migrated east and west. Caravan routes have been laid down with great exactness, both in old and in recent times, and Richthofen brings new proofs of the existence of such a one on the southern confines of the Tarim Basin, where discoveries of ruined cities have of late years been made.

To turn to the immediate scope of the book. The present volume contains 750 quarto pages, of which more than a third is taken up by the interesting introduction on Central Asia. The second part deals with the author's special subject, the "Development of Knowledge respecting China," without, however, this being enlarged beyond the limits of an introduction. A suspicion of prolixity might possibly here suggest itself, but such a notion would be quite erroneous. The author has perceived that, while there was no lack of excellent works on this subject, a comprehensive review of the abundant and scattered material, such as Ritter had attempted in 1832, was a real necessity. These he brings into prominence, more especially the Chinese sources of information which have come to light since that date. A chapter of 100 pages is devoted to the Yue-kung book, the oldest work on the geography of the Chinese Empire, and one held in repute since the earliest times for its accuracy and importance. In this and in the following chapters the author endeavours to develop the ground on which he bases his opinions (one of which is a belief in the trustworthiness of the Yue-kung) in a dispassionate and judicial spirit. Indeed, the strong scientific tone of the work throughout forms an excellent contrast to many geographical publications of the present day. Absolute completeness is, of course, unattainable, but certainly the number of books and pamphlets unnoticed is very small. We must in justice remark that, as this scientific matter is to be found chiefly in the notes, the thread of the general account of China is in no wise interrupted. This conducts us through the relations of China with the people of Central Asia (pp. 395-578), the arrival of the first Europeans in the Eastern kingdom in the Middle Ages, the first appearance of the Portuguese on the coast of the China Sea, the missions of the Jesuits, and the first despatch of embassies to Peking. This section ends with the approach of the modern period, the historical events of which are more or less within the recollection of most readers. First among these come the researches of scientific Europeans in China proper. And here a reflection pervading the whole work forces itself on one's attention, *i.e.* that the Chinese text books and other authorities are, as a rule, worthy of considerable reliance; and that these, through the misapprehension of European commentators, have been unfairly discredited hitherto. Indeed, ten years ago, we should have had a very indifferent map of China, if in the construction thereof we had had to renounce all Chinese maps. Richthofen considers them generally as reliable, and his great atlas of forty-four maps which he has in preparation is constructed chiefly from Chinese sources. The same remark applies equally to regions not belonging to China proper, such as (more especially) Tibet, the geography of which had recently been exhibited in a most confused fashion. He is strongly of opinion that until we have the results of new exploration before us, we are bound to stand by these Chinese sources of information. We may observe that Mr. Trelawney Saunders, in his careful map of the Himalayas and Tibet (see our number for July 1877), has shown his agreement with our author in this, in delineating the still unexplored tracts from the Lama Survey.

The eleven maps accompanying the first volume are purely general maps, illustrating Baron Richthofen's views, and are not designed to afford a topographical illustration of his travels. The publication of the atlas referred to will therefore be looked forward to with eagerness, but as this will in all probability take some years of preparation, we would suggest the advisability of Baron Richthofen publishing, with his second volume, a preliminary general map on a larger scale and with more details, especially as there is a great need of a good general map of China. It is a matter of considerable difficulty to follow Richthofen's routes on any existing map, owing to the similarity of Chinese proper names, and the widely-different manner in which they are spelt.

In conclusion, we must express our admiration of the elegant manner in which the work has been turned out. The importance of the subject, and the excellent method of treatment, entitle it to the first rank among the scientific works of our day.

THE CRUISE OF THE 'MAGENTA.'*

The cruise of the Italian corvette, 'Magenta,' round the globe belongs to a class of voyages which, with the gradually-lessening fresh fields of exploration, may be expected to take the place of those more stirring feats of discovery with which the pages of geographical history are illustrated. The gradual exhaustion of these unknown areas has of late years occasioned a diversion towards the more purely scientific side of geography, and the voyages of the 'Magenta,' the 'Novara,' the 'Challenger,' and others may be cited as one outcome of this movement.

We are reminded, however, in the work before us, that science was not the primary object in the equipment and despatch of the 'Magenta.' For some few years the Italian Ministry had been anxious to establish closer commercial relations with Japan and China, and in 1864 Signor Minghetti prepared to give effect to these wishes. Signor Cristofero Negri, of the Italian Foreign Office, was deputed to conduct the negotiations for a commercial treaty, and a scientific staff, qualified to report on the natural history of the countries visited, had been assembled together. At this juncture a change of Ministry supervened, and just as the retirement of the Gladstone Ministry, in 1874, broke off the preparations for our own Arctic Expedition, so did the fall of the Minghetti Cabinet put off for a time the despatch of the 'Magenta.' General Della Marmora, however, clearly considered that Italian interests demanded the despatch of the expedition, though not on so large a scale as at first proposed. As the 'Magenta' had already sailed for Monte Video, the scientific members embarked at Naples, on the frigate 'Regina,' together with a large and rich collection of Italian products, an item of no small consequence in negotiating a commercial treaty. The gentlemen referred to were the Senator F. de Filippi, a zoologist and Oriental traveller of repute; Clemente Biasi, a former travelling companion of the same; and the author, H. H. Giglioli, now Professor of Zoology and Comparative Anatomy in the Royal Institute of Florence.

Professor Giglioli's book, or "Descriptive and Scientific Narrative," as he terms it, is indeed a *magnum opus*, comprising, as it does, close on eleven hundred closely-printed quarto pages. The exhaustive manner in which every subject is treated reminds us a little of the classic writer who, when writing of the Trojan War, felt it incumbent on him to trace events back from Leda and her eggs. But, at the same time, it would be unjust to accuse the author of diffuseness. He has only brought into play great industry and remarkable powers of research in connection with nearly every noteworthy topic which comes before him, and the result is a work of travel which, for completeness and interest, it would be difficult to surpass.

The 'Regina,' with Captain Vittorio Armijon, the envoy, on board, left Naples on the 8th November 1865, on its westward mission to join the 'Magenta' at Monte Video. On nearing the Canaries, the author takes opportunity of supplying us with a complete history of early voyages to these islands, together with a general sketch of Italian maritime discovery in the Middle Ages; and the crossing of the Line, and the discussion of the route of the 'Regina' across the Atlantic, gives occasion for a learned disquisition on the meteorology of that ocean, as far as it bears on the routes of sailing vessels. These instances, chosen at random from among numerous others, will show that Professor Giglioli loses no opportunity of making the most of his theme for the time being. Indeed, there are few subjects that he seems to be unacquainted with—geology, meteorology, ethnology, and zoology being apparently all equally familiar to him.

After touching at Rio Janeiro, where the author amassed considerable information of interest regarding Brazil, the 'Regina' passed on to Monte Video, where she fell in with the 'Magenta,' and transferred thither all the officers and stores. The 'Magenta' was a screw corvette, built in 1860-61, length 218 feet, breadth 40 feet, and 500 horse-power, nominal. Her regular crew numbered 345, all told; but, in order to allow for the storage of provisions for a long journey, this number was reduced to 297. She is described as a bad sailer, and as unable to make much more than 10 knots under steam. On the other hand, she was commodiously fitted up, well ventilated, and was stored with four months' provisions. On the 2nd February, the 'Magenta' set out, across the Southern Atlantic, on its voyage of circumnavigation round the globe. The records of long sea voyages are never, at the best, fraught with incidents of much interest; and Professor Giglioli's work, though interspersed with zoological notes of value, does not offer much scope for remark in treating of the vessel's route from Monte Video, round the Cape of Good Hope, to Batavia.

In Java, Professor Giglioli devoted some attention to the question of coffee-growing, which has there attained such prosperous dimensions, as well as to the revenue systems adopted in that island during the respective periods of English and Dutch rule. The present system was introduced by General Van Bosch, in 1830, and by a felicitous arrangement, by which the cultivators, land-owners, and others interested in the tillage of the ground, share, together with the Government, in the profits, the enforced cultivation of colonial products has proved most remunerative to all parties, averaging a net profit to the State of over two millions sterling per annum during the forty-one years for which it has been in operation. As a recent writer has remarked, Java presents the spectacle of a gigantic estate, of unusual fertility, farmed to the mutual advantage of the Government and its subjects.

---

* *Viaggio intorno al globo della R. pirocorvetta Italiana 'Magenta.'* Dal Dottore H. H. Giglioli, Professore di Zoologia, ec., nel Regio Istituto di Firenze. Milano, 1875. 4to.

The 'Magenta's' next halting-place was Singapore, whence, after a stay of some days, she made for Saigon and Yokohama on the 26th May. Before dismissing the subject of the Malayan Peninsula, the author makes a brief digression concerning the Negritos, a race to which he assigns a wide distribution in former times, and remnants of which he professes to recognise in the Bushmen of Southern Africa, the Tikki-tikki discovered by Schweinfurth, the (so-called) Mincopai of the Andamans and Nicobars, and the Samans of Malacca. This view Professor Giglioli has expounded in a separate paper, of which, if we mistake not, the present section is a reprint.

The description of Japan in Professsor Giglioli's book is particularly interesting. The inquisitive but good-natured curiosity of the natives, their customs, dwellings, and avidity for Western civilisation is given with a minute faithfulness which conveys a very vivid picture of the country. In spite, however, of the strides which Japan is making, Giglioli plainly avows that the massacres and persecutions which have been inflicted in past times on Western immigrants may not improbably re-occur, and he does not hesitate further to ascribe much of this intolerance to the arrogance of the Roman Catholic missionary priests, who followed in the steps of S. Francis Xavier, whose proselytizing efforts in the 16th century were attended with a most extraordinary success.

The treaty with Japan was successfully negotiated (after some preliminary obstacles) on the 25th August 1866, and the presents, amounting in value to 8000*l.*, were duly distributed among the chief nobles and other functionaries. Before leaving the country, Professor Giglioli witnessed, among other interesting sights, a Japanese drama, and, in the interval between the acts, had the privilege of being invited behind the scenes and regaled with tea in the "green-room." Professor Giglioli owns that he had more sympathy with the Japanese than with any other people encountered by him in the course of his journey, and it is doubtless to this love of his subject that may be attributed the successful and interesting picture he has given us of the country and the people.

From Japan, the 'Magenta' proceeded to the Gulf of Pechili, whence Captain Armijon and suite ascended the Peiho, and travelled to Peking with the object of concluding the wished-for treaty with China. Every assistance appears to have been given by the other legations, who hailed Captain Armijon's mission with the most friendly feelings; Dr. Williams, of the United States' Legation, informing him that he (Armijon) had the honour of being the first envoy sent from united Italy to China since the reign of Marcus Aurelius, exactly 1700 years previously! The treaty was ratified in state on the 4th November by Chung Hang, the Imperial Commissioner, and the ceremony was appropriately wound up by a banquet, with a *menu* of 150 dishes, where the members of the Italian mission were provided with silver plate and champagne quite *à l'Européene.*

In treating of China, it is noteworthy that Professor Giglioli is no clamourer for the abolition of the export of Indian opium. He has arrived at a decided opinion, based on the views of medical and other authorities, who have seen much of opium smoking in China and other parts, that its use is not a whit more injurious than that of alcoholic stimulants, and that its prohibition would be attended with as many difficulties as the total closing of our public-houses. It is as well to take note of such testimony at times when we are being assailed with propositions that "England, at all events, should wash her hands of the opium traffic"—a proposal the haziness of which is only equalled by the misery which it would clearly bring on the already impoverished millions of India.

The immediate objects of the mission having been achieved, the 'Magenta' left Hong Kong and the shores of China on the 26th January 1867, having previously left at that city Signor de Filippi, who had been seized with fever, an illness to which he succumbed on the 9th February. Signor Giglioli evidently felt the loss of his able co-adjutor most keenly and his dedication of the work to the memory of his friend is couched in affectionate language.

The remainder of the cruise of the 'Magenta,' from Batavia round the continent of Australia to Melbourne and Sydney, and thence along the western coast of South America, through the Straits of Magellan home, does not call for special notice, and we would conclude with a few general remarks on the work before us. If there were any regret that the record of the cruise and of Professor Giglioli's exhaustive researches had been long delayed, this feeling would be dissipated by the admirable manner in which every subject of importance has been worked up. Authorities in nearly every language appear to have been carefully consulted, and this, combined with a fascinating style, has produced a result most satisfactory, especially in these days of endless travel-book-making. We must not omit the commendation due to the excellent printing and editing, and to the numerous woodcuts, which, being principally from photographic originals, convey ethnographical details with considerable faithfulness.

NARRATIVE OF THE NORTH POLAR EXPEDITION. U.S. Ship, 'Polaris,' Captain C. F. Hall, commanding. Edited by *Rear-Admiral C. H. Davis, U.S.N.* (Washington, 1876.)

SCIENTIFIC RESULTS OF THE UNITED STATES' ARCTIC EXPEDITION. Steamer 'Polaris,' C. F. Hall commanding. Vol. I. Physical Observations by *Emil Bessels.* (Washington, 1877.)

THE Narrative of the 'Polaris' Expedition was prepared from official papers and from the journals of officers and men, by Admiral Davis, of the United States' Navy, who died before the final revision of the proofs was completed. The book was brought out by Professor Nourse, of the Washington Observatory. It will be remembered that the statements of the officers of the 'Polaris' were very contradictory as to the state of the sea and ice at the most northern point reached in Robeson Channel. Admiral Davis, after weighing all the evidence, says that the ice was so compact that it was impossible to force the vessel through, and that, so far as could be seen, there was no open space to the north. He quotes

Herman Siemen's journal, who says "we saw firm ice from one coast to the other." It is, we are told, impossible to determine the precise latitude of the 'Polaris' at her highest point, for there was no observation; but the American Hydrographic Office has placed it at 82° 11′ N. They had, in fact, reached the edge of the Palæocrystic floes. This official narrative will prove a valuable record for reference, and is very handsomely printed and illustrated. The first volume, containing the results of observations taken by Dr. Bessels, treats of the hydrography, temperature of the air, hygrometrical observations, atmospheric pressure, winds, solar radiation, terrestrial radiation, the face of the sky and state of the weather, observations on ozone, meteorological observations taken at sea, the chronometer journal, astronomical observations, pendulum experiments, magnetic observations and lists of Auroras, and psychrometrical tables. The remarks on the currents and the discussion of tidal observations are very elaborate, while the whole volume contains a mass of carefully-reduced observations, which, considering the exceptional difficulties under which Dr. Bessels laboured, are most praiseworthy. We have pleasure in congratulating him on the appearance of this volume, the first instalment of his valuable labours in the Arctic Regions.

——:o:——

The American Naturalist for September, 1877. (Boston: H. O. Houghton & Co.; London: Trübner & Co.)

The *American Naturalist* for September contains three papers of special interest. The first is an elaborate and well-illustrated paper on "Reproduction in Fresh-water Algæ," by Baron D. Halstead. This is followed by one on "Surface Geology of the Merrimack Valley," by Warren Upham, a subject which will prove of great interest to summer travellers in New Hampshire and the North-eastern parts of Massachusets. The third is an essay by Dr. Joseph Leconte "On Critical Periods in the History of the Earth, and their relation to Evolution; on the Quaternary as such a Period." These papers constitute the body of the number under notice; but there are besides reviews of new books treating on Natural History; general notes in the various departments of science, and scientific news, which well deserve perusal.

——:o:——

Livingstonia. By *F. A. Edwards.* (*Gentleman's Magazine* for October. Chatto and Windus. 1877.)

The current number of the *Gentleman's Magazine* contains an article on "Livingstonia," from the pen of Mr. F. A. Edwards. The paper is an excellent *résumé* of the progress of the mission, named after the great traveller, from the time when it left our shores, in 1875, under the able leadership of Mr. Edward D. Young, R.N.; and we have very little doubt but that it will be read with great interest by all concerned in the welfare of Africa. A sketch map accompanies the paper.

The Central African Expedition of the Church Missionary Society, under Wilson and O'Neill, reached the Ukerewe (Victoria) Lake on the 29th January last, after a six months' journey, and touched it at the same point that Stanley did. They had since proceeded northward and had traversed the Ituru country, where Stanley had fought with the natives two years before, but found them peaceably disposed, and apparently ignorant of the affray referred to. In Kagehyi, Stanley's old camp on the southern shore, they found the grave of Frederick Barker, his companion. The expedition hoped shortly to be able to launch a vessel on the lake, and to cross over to King Mtesa, of Uganda, and so to found, with that chief's aid, a well-organised and prosperous mission station.

Cartography.

——:o:——

Kanitz's Map of Bulgaria and the Balkans.

The long-expected Map of Bulgaria and the Balkans, by F. Kanitz,* referred to in our May number as having been awarded a prize, while in preparation, at the Paris Exhibition of 1875, embodying the topographical results obtained during fifteen years of travel, has at length been published. An edition with French title and notes is issued separately by Messrs. Hachette,† and a German edition,‡ coloured to show the political divisions, is given with the September number of *Petermann's Mittheilungen*. The map embraces the whole belt included between the Danube and the southern slopes of the Balkan range, from the valleys of the Morava and Timok, on the west, to the Black Sea coast on the east, and has been reduced by the photo-zincotype process from the original drawing by Herr Kanitz, on the scale of $\frac{1}{288000}$, into one sheet on the scale of $\frac{1}{625000}$, or nearly 10 English miles to an inch. The routes traversed by Herr Kanitz form a close network over the whole of this region, and include not fewer than seventeen crossings of the Balkans by distinct passes. The points astronomically and trigonometrically fixed by the Russian and Austrian surveyors have served as a basis for the map; but beyond these the whole work depends exclusively upon Herr Kanitz' original surveys and measurements. Comparing it with the sheets of the map issued by the Vienna Institute,§ which embrace the same ground, on nearly double its scale, it is found to be even richer in detail in some portions, at the same time presenting very considerable differences in topography from the Austrian map. The chief towns and boundaries of vilayets, mutessarifliks, circles, and districts are distinguished by separate signs, as are also the Christian and Muhammadan villages, the convents, fortifications, and post stations, besides railways, highways and carriage roads, paths and mountain tracks.

Very unfortunately, the rapid process which has been adopted in reproducing Herr Kanitz' drawing, and the great reduction in the lettering, have resulted in giving a generally blurred and hazy appearance to the map, and in making fully a third of the names it contains all but illegible.

Stanford's Library Map of Africa.‖

We have received from Mr. Stanford a new edition of his Library Map of Africa, which is well known as the largest in scale, and the best general map of the continent in existence. Indeed there is no other to compare with it. In this edition the results of all the later explorations, such as those of Cameron in the south, of Nachtigall in North Africa, of Colonel Gordon's staff in the Nile basin, and of the missionaries in Madagascar, seem to have been duly incorporated. Recent political changes, including the annexation of the Transvaal to the British dominion and the extension of Egyptian rule, are also clearly indicated by the colouring. Of late years it has, indeed, become a very difficult matter to keep pace in cartography with the rapid march of African discovery, especially to maintain any general map of the continent on a large scale, so closely up to the level of ever-increasing information, as to make it at any moment a true representative of existing knowledge. Most of the existing geography that can be shown on it is also made up by compiling or weaving together many inperfectly-surveyed routes, and each newer, or more accurately-determined line necessitates a re-adjustment of the entire surrounding portion of the geographical web. A weekly or monthly edition of such a map as this would now seem to be almost necessary. Since this edition was published, a few days ago, for example, the completion of Stanley's grand march across the tropical belt has filled up the main feature of the great blank which here appears separating the Lualaba from the Congo, and the publication of Dr. Pogge's itinerary to the capital of the famous West-African potentate, the Muata Yanvo, has thrown new light on the region which lies inland from the Portuguese West-African possessions.

---

* Author of *Donau-Bulgarien und der Balkan*: Historisch-geographisch-ethnographische Reisestudien aus den Jahren 1860-1875. Leipzig, Bd. I., 1875; Bd. II., 1877.

† Carte Originale de la Bulgarie-Danubienne, des Balkans, et du sud-est de la Serbie, d'après ses notes de voyage, par F. Kanitz.

‡ Original-Karte von Donau-Bulgarien, dem Balkan, und Süd-ost-Serbien, nach seinen Reise-aufnahmen von F. Kanitz. $\frac{1}{625000}$.

§ K. K. Militargeogr. Institut. "Karten Türkischer Landestheile, aus den General Karten von Central-Europa." Scale, $\frac{1}{300000}$. Secs. N. O. P., 11 and 12.

‖ Stanford's Library Map of Africa, constructed by A. Keith Johnston, F.R.S.E. (London: Stanford. 1877.) Scale 94 miles = 1 inch. 4 sheets.

Log Book.

——:o:——

Mr. Stanley's Discovery of the Course of the Congo.—*The Daily Telegraph* has published the following important news of Mr. Stanley's discovery, dated from Embomma, on the Congo, on August 10, 1877.—"On the 8th inst. I arrived at this place from Zanzibar, with 115 souls, in a fearful condition. We left Nyangwe in Manyema Nov. 5, 1876, travelling overland through Ureggu. Unable to make progress through the dense forests, we crossed Lualaba, and continued our journey along the left bank, through North-East Ukusu. Natives opposed us, harassed us day and night, killed and wounded our people with poisoned arrows. Our struggle through these cannibal regions became almost hopeless. We endeavoured to appease the savages with gifts and mildness. Our gifts they refused; our patient behaviour they regarded as cowardice. To make our position still more deplorable, our escort of 140 men engaged at Nyangwe refused to proceed farther. At the same time the natives made a grand effort to crush us altogether. We defended ourselves, but there was only one way to escape from our hapless position—unless we accepted the alternative of returning, and abandoning the work which we had begun—and this was by making use of our canoes. Though we had decided advantage over the savages on the water, still each day's advance was but a repetition of the day previous. It was desperate fighting, pushing on down river with might and main until, in the midst of these successive struggles, we were halted by a series of great cataracts—five in number—not far apart—south and north of the Equator. To pass these we had to cut our way through thirteen miles of dense forest, and drag our eighteen canoes and exploring boat overland, frequently exchanging the axes for the rifles as we were attacked. After passing these cataracts we had a long breathing pause from the toil of dragging our vessels overland. At 2° north latitude the Great Lualaba swerved from its almost direct northerly course, to north-west, then west, then south-west; a broad stream from two to ten miles wide, choked with islands. In order to avoid the exhausting struggle with so many tribes of desperate cannibals, we had to paddle between the islands, until, compelled by hunger most extreme, after three days passed without absolutely any food, we resolved to meet our fate, and struck for the mainland on the left bank. Happily, we had reached a tribe acquainted with trade. They possessed four muskets from the West Coast, and they called the great river Ikutu Ya Congo. We made blood brotherhood, and purchased abundance of provisions; and endeavoured to continue our course along the left bank. Three days later we came to a powerful tribe all armed with muskets, who, as soon as they sighted us, manned 54 large canoes, and attacked us. Not until three of my men were killed did I desist from crying out we were friends, and offering cloths. For a distance of 12 miles the greatest and most desperate fight on this terrible river was maintained. This was the last, save one, of the 32 battles on the Lualaba, which river, after changing its name scores of times, became known as we approached the Atlantic Ocean as the Kwango and the Zaire. As the river runs through the great basin which lies between E. long. 26° and E. long. 17°, it has an uninterrupted course of over 1400 miles, with magnificent affluents, especially on the southern side. Thence, cleaving the broad belt of mountains between the great basin and the Atlantic Ocean, it descends by about 30 falls and furious rapids to the great river between the Falls of Yellala and the Atlantic. Our losses have been most severe, and my grief is still new over the loss of my last white assistant, the brave and pious young Englishman, Francis Pocock, who was swept over the Falls of Massassa, on June 3, last. The same day I with seven men was almost drawn into the whirlpools of Mowa Falls: and six weeks later myself, and the entire crew of the Lady Alice, was swept over the furious Falls of Mbelo, whence only by a miracle we escaped. My faithful young companion Kalulu is also among the lost.

"From Boma I take the expedition by steamer to Cabinda, thence to St. Paul de Loanda."

The Whaling Fleet.—The following has been the take of the Baffins Bay whaling fleet:—

'Arctic'—180 tons of oil (7 whales and 380 white whales)
'Aurora'—130 tons of oil
'Esquimaux'—105 ,,
'Polynia'—78 ,,
'Camperdown'—70 ,,
'Narwhal'—55 ,,
'Jan Meyen'—48 ,,
'Victor'—45 ,,
'Nova Zembla'—32 tons of oil
'Ravenscraig'—30 ,,
'Erik'—12 ,,
'Intrepid'—10 tons of oil (22 narwhals)
'Active'—8 tons of oil (42 walruses)
'Harold Haarfager' (*clean*)

The total catch was 753 tons. Last year it was 891 tons.

Captain Adams, in the 'Arctic,' went first to Newfoundland for seals, and proceeded thence to the fishing ground, where he succeeded in catching 24,000 seals (of which 1500 were the large hood seals), representing 350 tons of oil. In the second voyage he got 6100 old seals, yielding about 150 tons. Altogether the 'Arctic' doubled the best ship in the whole Newfoundland fleet. On May 25th, Captain Adams left for Baffins Bay, and joined the rest of the fleet in Melville Bay. He reports that this year there was no North Water, and that there was one block of ice from Smith Sound to Cape Farewell. After visiting the Cary Islands, where the depôt of the Arctic Expedition was found to be untouched, he reached Lancaster Sound with great difficulty. The 'Arctic' experienced a very severe nip off Navy Board Inlet. At Admiralty Inlet he got eight fish, and another in Prince Regent Inlet, but the whole country was encumbered with ice to an unusual extent. In Elwon Inlet, Captain Adams obtained 385, and the 'Aurora' 550 white whales. Captain Adams brought home a very intelligent leading Eskimo, named Olnik, from Cape Eglinton, last year, who passed the winter at Dundee, visited London, and dined with the Lord Mayor. He was landed at his settlement again, where he was very cordially received by his family and friends. A general meeting was held, and Olnik related all his adventures, and all the wonderful things he had seen, the audience listening with wrapt attention. On the 2nd of September, Captain Adams left Cape Eglinton and bore up for Dundee. In Ponds Bay he caught no fewer than 3000 salmon in two tides by an improvised net. The 'Arctic' reached Dundee on Tuesday, the 18th of September.

Sea Communication with Northern Siberia.—The 'Polar Star,' the first vessel ever constructed at Yenisseisk, and the property of M. Sidorof, has arrived in Norway, in twenty-one days' time, from the mouth of the Yenissei. M. Schwanenberg, the skipper, telegraphs as follows:—"Arrived safe and sound at Wardö. I fell in with the steamer 'Frazer' on the 9th August at Golchitka. I doubled Bely Island, where I hoisted the Russian flag on a mast, and left an account of my trip, written in three languages, in a sealed-up bottle. I saw plenty of reindeer at Bely Island. I encountered ice in the Matochkin Strait, and crossed the Sea of Kara on the 18th August. The winds were contrary, and accompanied with sleet. The ship is a bad sailer."

The Wyse Darien Surveying Expedition.—We have given some account of the proceedings of this Expedition in former numbers, and now record the results that have been attained. The object of the undertaking was to survey for a canal without locks or tunnels, by way of the Poyita and Cacarica Rivers, as it was supposed that a deep hollow existed between the Acquiagua Valley and an imaginary valley to the left of the Paya River. The party found that the Acquiagua gorge does not touch the Paya basin. The levels taken along the Paya River, which is full of rapids, gave the village of Paya a height of 250 feet above the lowest level observed on the Tuyra at Pinogana. Following up the Paya River on the Pacific side, the party reached a point less than 330 yards from the Nalubquia, a tributary of the Cacarica, on the Atlantic slope. The gorge of the Tihule is 420 feet above the level of the Tuyra River at Pinogana, and 450 feet above the lowest tides. These figures destroy all hopes of opening a canal through a gap between the Cordilleras without locks or tunnels. M. Celler proposes, as an alternative, the construction of a canal about 65 miles long, with reservoirs and groups of locks. It would start at Real de Santa Maria, on the Tuyra, by Pinogana and the Cupé River, to the high plains in the Upper Tuyra, then down the Tulequa, on the Atlantic slope, to the Atrato, avoiding the windings of the Cacarica. The summit, by this route, is about 160 feet above the sea. Lieutenant Wyse afterwards explored the Valley of the Chacunaque River, and suggested another canal thence to the Atlantic, near Point Gandi.

Altitudes in Bolivia.—The following altitudes in English feet, taken by Mr. Minchin this year, result from boiling-point observations, the approximate height in the tables being augmented by its 900th part multiplied by the difference between the sum of the air temperatures at the upper and lower stations, and 64° F., to which a small correction for the hourly variation is applied.

The temperature of the lower station (sea level) is assumed to be 72° F. in the morning and evening, and 75° F. during the daytime:—

Place.	Height.	Place.	Height
Sucre	9,319	Leñas	13,079
Pampatambo	9,971	Tolapalca	13,572
Siporo	11,003	Calamarca	13,182
Machacamarca	12,849	Cucuta	12,936
Mamahuasi	9,835	Viacha	12,534
Ocuri	13,096	Corocoro	12,948
La Palca	12,002	Sebollallu	8,279
Colquechaca	13,849	Junction of La Paz and Sebollallu Rivers	7,542
Quebrada Honda	11,598	Carapata, 65 ft. above Lake Titicaca	12,576
Bartolo	11,206		
Samasa	12,097		
Potosi	13,024		

The exact height of Lake Titicaca, according to the levels in the Arequipa and Puno Railway, is 12,545 feet.

Making use of this for the upper or lower station, and being able to estimate the temperature of air more closely, the following altitudes result:—

Place.	Height.	Place.	Height.
La Paz	11,972	La Cueva (Tora)	2,235
Achacachi	12,557	Tipuani	1,820
Sorata	8,715	El Huanay	1,400
Pestia	5,403	Tuanani	3,533

Highest point of pass to Yungas, on La Paz Cordillera, levelled with spirit level from La Paz, 15,308 feet; also of La Paz (level of plains) by angles from city, 13,413 feet; Illimani, from angles at La Paz and Ventilla, 21,039 feet; Cerro Hermoso, by angles from Colquechaca, 16,490 feet.

Altitudes by aneroid, corrected by boiling point observations, at similar heights:—

Place.	Height.	Place.	Height.
Oruro	12,180	Ancacato	12,700
Cochabamba	8,880	Sicasica	12,430
Santa Cruz	1,500	Misque	6,434
Payña, almost on level of Lake Poopo	12,280	Aiquili	7,300

	Lat.	Long. W. Greenwich.
Sucre	19° 02′ 45″	65° 17′ 00″
La Paz	16° 29′ 59″	67° 58′ 45″

Guatemala.—The system of telegraphic communication is now complete throughout the Republic of Guatemala, and embraces 1073 miles of wire, with forty-two stations. A railroad is also projected between the port of San José, on the Pacific, and the city of Guatemala, the contractor being Mr. Wm. Nanne. Coffee is being cultivated and exported to a great extent, the yield this year being nearly 15,000,000 lbs., worth $3,000,000. Education is also receiving attention, and the number of schools throughout the country has recently been increased. This moral and material progress is due, in a great measure, to the firm, yet liberal and enlightened, rule of President Barrios.

The Marquesas Islands.—According to a report of Captain Miner, of the U.S. steamer 'Potomac,' who arrived at S. Francisco in the early part of July last, from the Marquesas and Society Islands, the tidal wave, which proved so disastrous in Peru on the 9th May last (see our number for August, p. 206), was felt on the same day at Nukahiva and Tailohae Bay, where the wave rose to a height of 14 feet. The fine plantations of Captain Hart were destroyed, and the natives fled for refuge to the neighbouring hills. A peculiar feature was the heavy fall of rain which ensued, and which lasted twelve days and occasioned great disasters.

Heights in the Alai and Pamir.—Captain Kostenko writes to the *Russische Revue*, to express his regret that there are some mistakes in the heights given by him in his letters descriptive of the recent Russian military expedition in the Alai country. The correct heights, in feet, are as follows:—

Gulcha	5,100
Kizyl-Kurgan	5,600
Sufi-Kurgan	6,600
Archat Pass	11,900
Camp on Kizyl-su	10,100
Mouth of Kizyl-art Ravine	11,400
Kizyl-art Pass	14,000
Kara-Kul Lake	13,200
Ala-Baital Pass	15,400
Confluence of Uzbel-su and Chonsu ...	13,300
Uzbel Pass	15,200
Foot of ditto	14,300
Archi-bulek, on Alia	10,000
Darant-Kurgan	8,000
Great Karamuk	7,400
Gurumdu Pass	10,600
Kara-Kasyk Pass	14,400
Kishlak-Shah-i-mardan...	4,400
Wadil (town)	2,800

The limit of snow on the Pamir is between 16,000 and 17,000 feet, and on the Alai Mountains 14,000 feet.

Correspondence.

EARTHQUAKES ON THE COAST OF PERU.

To the Editor of the "GEOGRAPHICAL MAGAZINE."

SIR,—I beg leave to make the following remarks concerning the article, "The Great Earthquakes on the Coast of Perú," which appeared in your number for last August.

In the part of it that gives an account of the great earthquake at Mendoza, March 20, 1861, it is said that no shocks were felt in Chile. This is not so, for I experienced in Valparaiso, at 8h. 35m. of the same day, a violent undulating movement, which lasted fifty seconds. This shock was felt everywhere in Valparaiso, and the people ran into the streets. The barometer read 759·5 min., and the temperature of the air was 18° C.

On the 13th of August 1868 I saw in Valparaisȍ at 8h. 30m. P.M. a strange phenomenon of luminous nature towards the south, which resembled lightning, but was of much longer duration. There were no clouds to be seen, and the weather was fine. I booked this phenomenon in my meteorological journal, not having then the least knowledge of the great earthquake in Perú. The barometer was pretty high (about 766 min., uncorrected) and the temperature 9° C.

1873. July 7.—No houses in Valparaiso were thrown down by the earthquake, but some in the Puerto were damaged (not in the Almendral, where the houses are smaller). The shock was stronger in Limache and Quillota, and strongest a little farther to the north (la Ligua). In Limache the roofs of several houses came down, but no lives were lost. In Santiago, where I was living, the shock was also very strong, though not so violent as in Valparaiso.

I hope that you will kindly excuse my having encroached upon your valuable time, and remain respectfully, yours, &c.,

J. ASMUS,
Assistant in the Hydrographic Office of the Imperial Admiralty.
MATTHÄIKIRCH STRASSE 9, BERLIN W.
August 23, 1877.

To the Editor of the "GEOGRAPHICAL MAGAZINE."

SIR,—The *Academy* of 18th Aug. tells us that "*a remarkable* natural phenomenon, supposed to be connected with the recent great earthquakes on the Pacific Coast," has happened in the district of Charcas, on the Pacific Coast, by a "rapidly-increasing" lake. If we attend to the laws of Nature, we see nothing remarkable in this. By referring to the chapter on earthquake in my *Incidents in the Biography of Dust*, lately sent to you, it will be seen that many earthquakes have been attended with subsidings of surface areas into water, so that lakes and swamps have been suddenly formed, where dry land previously existed. The submerged area does not necessarily exhibit to us the entire extent of subsidence. In the earthquake alluded to, that subsidence was extensive enough to cause the waves which rolled over the Pacific Ocean. These incidents are sufficient proof, that earthquakes are not always connected with volcanic action, and that the evasion of subterranean waters do cause subsidencies of surface areas into the water which had destroyed the foundations.

H. P. MALET.

HOMBURG, *August* 19, 1877.

COPPER MINES IN SOUTH AFRICA.

To the Editor of the "GEOGRAPHICAL MAGAZINE."

SIR,—I read with much surprise, in the last number of the *Geographical Magazine*, the statement of Sir James Alexander, that he was the discoverer of copper in South Africa. The existence of copper ore in the neighbourhood of Sir James' researches was known nearly two centuries ago, as an extract from the report made to the Dutch Government of the Cape Colony, of which I enclose copy, will clearly show.

I resided at the Cape before Sir James made his *discovery*, and can assure you that it was well known in Cape Town that copper ore was abundant in the neighbourhood of the Orange River, and some hills or mountains were marked on the old maps "Kopperbergen." By publishing this you will oblige

A Subscriber.

London, *September 21st*, 1877.

"*Report to the Governor, Ryk Tulbagh, by Carl Christoffel Rykvoeh, who was appointed to the Commission for Examining the Country of the Namaquas, in* 1762.

"After my arrival at the first great copper mountain, which was visited by the Governor, Simon van der Stell, and others in 1685, I found, upon examination, that the ore of that mountain produced but a very trifling quantity of copper.

"I then proceeded to examine the small copper mountain lying close to it, and discovered that the same, *pro rata*, possessed more copper. This, which is a circular mountain, is situated upon a plain, about 40 or 50 yards high (one can walk round in about a quarter of an hour), and, if sufficient water and fuel could be found, which at present cannot, mining operations might be here commenced.

"I then proceeded to the Great, or Gariep River, and examined with great accuracy the copper ore which is seen in the mountain, standing along the river, being a green ore of the same description as that which the Burgher, Jacobus Coetzee, in the year 1760, upon his return journey, brought some specimens of, and, by a small proof, found that it contained more than a third of pure copper. This mountain consists entirely of high and hard rocks, being in various places marked by veins of green, intermixed with white, which gives the mountain the appearance of white marble; while, in other places, veins looking like copper show themselves," &c.

The above was dated Cape of Good Hope, May 4th, 1762.

Proceedings of Geographical Societies.

:o:

FRENCH GEOGRAPHICAL SOCIETY.

August 1st, 1877.—M. Levasseur presiding. A letter was read from M. Louis Desgrand, President of the Geographical Society of Lyons, communicating certain criticisms passed by Colonel Champanhet, in a paper recently read before the Society, on M. Roudaire's scheme of an inland sea in the *chotts* of Algeria. The Colonel's objections to the project are, that it will benefit the Tunisians, Italians, and Germans more than the French and Algerians, and that it would not, in any way, serve to the latter as a route into the interior; that the humidity of the atmosphere will principally benefit Tunis; that it will take thirty years to construct; that, when completed, it will be liable to the same desiccation which overtook the former sea there; and, lastly, that it is quite useless to expect it will act as a barrier to the invasions of the locusts, as this pest is encountered in the Balearic Islands

M. Jules Crevaux writes from Cayenne, under date the 2nd of July, to announce his departure for the Sierra de Tumucuriac on the 10th of August. He proposes to reach the interior of French Guiana by way of the Maroni, and is to be accompanied by M. Emonet, the apostolic prefect, and Père Kroenner, a misssionary, the latter having been already sent on ahead to buy boats and hire crews. On reaching the mountains the boats will, of course, be abandoned, and the hardest part of the journey will begin.

Announcement was made that the Triennial International Congress of Geodesy would be held at Stuttgart in the last days of September, under the presidency of the Spanish General Ibanez, the vice-president being Professor Bauerfeind, formerly of the Polytechnic School of Munich. The Dutch Geographical Society communicated information respecting the departure of the Sumatra Exploring Expedition from Padang, in May last, and their successful progress.

:o:

ANTWERP GEOGRAPHICAL SOCIETY.

We have received the *Bulletin* of this Society, which dates its existence from the 1st of October 1876. The President is Lieut.-Col. H. Wanwermans; Vice-Presidents, Dr. Louis Delgeur and Consul E. A. Grattan; and General Secretary, P. Gerrard. The opening meeting took place on the 14th January 1877, when an introductory address was delivered by the President, and the names of the effective and honorary members announced. Among the latter are the following: Sir G. Airy, Sir B. Frere, Dr. Bastian, Herr von Becker, Signor Correnti, M. Delesse, Dr. von Hochstetter, M. de Khanikof, Count de Lesseps, Mr. Major, Commendatore Negri, Dr. Petermann, Sir H. C. Rawlinson, Admiral Richards, Admiral de la Roncière-le-Noury, M. P. J. Veth, and M. Vivien de St. Martin. Among the corresponding members are Dr. Behm, Signor Cora, Herr O. Delitsch, and Major Wilson.

Two prizes of 500 francs each were announced for competition. The one presented by Baron van de Werde and de Schilde is for the best history of a Belgian, belonging to Antwerp by birth or family, who by his labours or discoveries has contributed to the progress of geography. Competitors are allowed to select whom they please; their attention is, however, drawn to the names of Peter van den Broecke, born at Antwerp about 1580; J. B. Grannuaye, born towards the end of the sixteenth century; J. A. Cobbe, born 21st March 1682; and F. B. Solvyns, born 6th July 1760. The second prize of 500 francs, awarded by the Councillors of the Society, is to be awarded for the best description of the Azores and history of their colonisation from the Belgian point of view.

The *Bulletin* contains two interesting original papers: one by the President on the Sources of the Nile, the other by Dr. L. Delgeur on the Slave Trade.

Death of the late President of Chile.—We regret to have to announce the sudden death, on the 20th of last July, of Don Frederico Errazuriz, the late President of Chile, whose administration did so much to further the work of marine surveys, and to establish an efficient hydrographic department.

NOTICE.

The Office of The Geographical Magazine *is at* 57 *&* 59, *Ludgate Hill, E.C.*

Manuscripts sent to the Editor cannot be returned, nor can the Editor be responsible for them.

Letters and Articles intended for insertion should be written on one side of the paper only, and must be accompanied by the name and address of the writer; not for publication, but as a mark of good faith.

The right of translation is reserved.

Annual Subscription and Postage, £1, *Inland. Foreign Orders must be accompanied by P.O.O. or Cheques to include the full amount of Foreign Postage. Post Office Orders to be made payable to Messrs. Trübner & Co.,* 57 *&* 59, *Ludgate Hill, London, E.C.*

THE

GEOGRAPHICAL MAGAZINE.

NOVEMBER, 1877.

IRRIGATION IN SOUTHERN INDIA.

III.

THE BASIN OF THE KAVERI (CAUVERY).

WE propose to continue our description of the river basins of India, proceeding northwards from Cape Comorin. In our number for December 1874 (p. 364) we gave some account of the Tamraparni system of irrigation, in the extreme south of India; and in November of the same year (p. 328) we described the Periyâr project, and the system of irrigation from the Vaigai River, in the district of Madura. Proceeding northwards, the next irrigation system is connected with the far more extensive river basin of the Kaveri (Cauvery). The Kaveri basin has an area of 27,700 square miles, and the length of the river's course is 472 miles. The hypsographical map of Southern India facing page 329 of our number for November 1874 will also serve to illustrate the present article.

The sources of the Kaveri lie in the mountainous recesses of the Western Ghâts; the most northern, called the Hemavati and Yagachi, rising in Hassan, a province of Mysor; the Kaveri itself and the Lakshmantirtha, in Coorg; the Kabbani and Nugu, in Wainaad; and the Moyaar and Bhowani, in the Nilgiri hills. These districts border on each other from north to south. First the mountainous region of Hassan, then the lovely ridges and ravines of Coorg, contain the fountains of the sacred river itself. Coorg is divided from the Wainaad district by the Brahmagiri Range, and Wainaad extends for a length of about 50 miles to the feet of the Nilgiris, which rise up from the Wainaad plateau like a massive wall, with many silvery cascades pouring over its face. On the western or Malabar side these mountains rise abruptly from the plain, and are covered with magnificent forest. The plateaux are broken into a succession of ridges, sometimes rising into lofty peaks, which enclose valleys or flats; while on the eastern side the descent is more gradual, and is also covered with forest. The peaks rise to heights of 5000 to 8000 feet.

The S.W. monsoon strikes full against the western scarp of the ghâts, and here there is a rainfall of 160 inches. But the western wall is steep, and the drainage area on that side is narrow; so that the largest proportion of the water from the S.W. monsoon is received by the sources of Kaveri, and taken away across India to the eastern coast. It is nearly all deposited between the months of May and September. The greatest fall, of course, takes place along the western faces of the ghâts, where the clouds, heavily charged with the moisture from the Indian Ocean, suddenly enter the colder stratum caused by the mountains, and are at once condensed. As they advance across the plateaux the rainfall sensibly decreases, and in Mysor, to the eastward, there is a very dry belt of less than 30 inches fall in the year, the clouds having been wrung dry. But, on the plateaux, the rainfall, in special localities, is affected by the smallest variation of aspect and shelter. While the rainfall of the western scarp is 160 to 200 inches, it is only 140 inches in about the centre of Coorg and Hassan, and 86 on the Dodabetta peak, in the Nilgiris. At the Chumbra hill, in Wainaad, the rainfall is 186 inches on the western, and 154 inches at only a few miles' distance, on the eastern sides, where the slopes are sheltered from the monsoon by precipitous peaks. At the chinchona plantations of Nediwutam, about 8 miles to the eastward of the line along which the S.W. monsoon first bursts, the rainfall is 127 inches. At Mysor, further away to the east, the average annual rainfall is but 29 inches.

Thus the great wealth of waters is received by the sources of the Kaveri in the mountainous recesses of the ghâts, and they send it forth over the arid regions to the eastward, where it is a necessary of life to millions of people. It is no wonder that these sources are looked upon with feelings of awe and veneration, as representing beneficent and life-maintaining deities. I propose to refer to each of the head waters, beginning from the north, treating of their courses while yet among the hills; and then to return to them when they have reached the plains, and to give some account of the useful work they there perform.

The most northern affluent of the Kaveri is the Hemavati, rising at Jávali, and flowing through the coffee district of Munjarabad in Mysor. Hemavati means "the golden river." In its upper course it receives four mountain streams—the Somavati, Aigur, Kete-halla, and Yagachi. The latter stream rises on the southern slopes of the Baba-Budan hills, and three dams are placed across it, from which irrigation channels are led off. These are the Bomdihalli dam in the Belar taluk, which provides irrigation for 290 acres from a channel 4 miles long; the Halvagal dam, three miles west of Hassan, irrigating 176 acres; and the Chengravalli dam, three miles from the confluence with the Hemavati, irrigating 168 acres. The area of the catchment basin of the Yagachi is 520 square miles, of which 28 per cent. is under the tank system. The Yagachi is the chief hill tributary of the Hemavati. It is also called the Badari, both names meaning the jujub tree, the one in Canarese, the other in Sanskrit. The Hemavati is believed to be the daughter of Daksha and the wife of Isvara. She is said to have cast herself into the fire at Daksha's sacrifice because Isvara was not invited, and to have come out of the colour of gold (*hema*). Becoming incarnate as the daughter of Himavat, she performed penance in the hope of being reunited to Isvara, who appeared to her, and directed her to take the form of a river for the good of the world.

The next river to the south is the Kaveri itself, the *Kabœris* of Ptolemy and the Greek geographers. It is also called the Dakshina Ganga. The source at Tala Kaveri, in the recesses of the Coorg mountains (12° 25′ N. lat.), is a reservoir 10 feet square by 2 deep, surrounded by wild and picturesque scenery. The Kaveri is the most sacred river in Southern India, and, in the eyes of a Brahman, to bathe in it is to be purified from all sins. Its divine origin is related in the Kaveri Mahatmya of the Agneya and Skanda Puranas. Originally the deity of the river was Vishnumaya, a daughter of Brahma. She became incarnate as Lopamudra, a nymph of exquisite beauty formed by the famous Rishi Agastya, from the most graceful parts of the beasts of the forest. She became the daughter of Kavera-muni, and hence her name of Kaveri. In order to secure happiness for her earthly father, she resolved to become a river, the merit of whose waters in absolving from all sin and blessing the earth, should accrue to him. But Agastya wished to marry her, so, to reconcile the conflicting claims, Lopamudra, or the mortal part of her nature, became the wife of Agastya, while Kaveri, or the celestial part, flowed forth as a river. Another form of the legend is that Lopamudra had resolved to become a river when Agastya asked her for his wife. She consented, though longing all the time to be a river, on condition that she might forsake him whenever she was left alone. One day he left her to go and bathe, when she instantly jumped into his holy tank, and flowed forth as the River Kaveri. The Rishi, on his return, ran after her in despair; but he was only allowed the melancholy satisfaction of instructing her what direction to take in her course towards the Bay of Bengal. Near the source of the Kaveri it is joined by a mountain stream called the Kaniki, the nymph of which is also the heroine of a romantic legend. Three temples stand at the junction of the Kaniki and Kaveri, and several thousand devotees repair to the annual feast at Tala Kaveri in September. The upper course of the river is very tortuous, with banks overgrown by stately forest trees, and from November to May the depth is only about 2½ feet. The streams flowing to the Kaveri from the hills of Coorg are in ravines where there are narrow low-lying strips of rice lands between the spurs. They are retentive of moisture, and only require a tank or dam large enough to supply water three or four times at the most critical period, without sluices or stone facings. The same system also supplies the garden lands of Coorg at the head of each minor valley, the tanks not being in chains or dependent on each other. The cultivated valleys are generally covered with rice, and fringed with plantain groves and sago palm (*Caryota Urens*). The huts of the Coorgs are in the midst of these groves, generally with a small coffee garden near at hand. Thus the Kaveri commences her beneficent work as soon as she issues from her fountain, and long before she reaches the arid plains.

The next river is the Lakshmantirtha, which rises on the northern slopes of the Brahmagiri hills, drains the southern half of Coorg, and joins the Kaveri near the foot of the hills.

The Kabbani, with its tributary the Nugu, receives the drainage of Wainaad, a district averaging an elevation of 3000 feet above the sea, in the direct line of the Western Ghâts between Coorg and the Nilgiris, 60 miles long by 30 broad, with an area of 725,000 acres. The country drained by the Kabbani and Nugu consists of a belt of dense forest, here and there intersected by paddy flats. The streams are all fordable in the dry season, but during the monsoon they swell to a great size, often rising 30 feet with a width of 200, and dashing furiously along with masses of tangled branches and uprooted trees. Coorg and Wainaad are the great coffee-producing districts of Southern India.

The Nilgiri hills are drained by the rivers Moyaar and Bhowani, the one receiving all the northern streams and the others those flowing down the southern slopes. The rivers then form a sort of moat round the northern and southern sides of the Nilgiri mountain mass, and, uniting to the eastward, eventually fall into the Kaveri. The plateau of the Nilgiri and Kundah hills is 7000, and Dodabetta, the highest peak, 8640 feet above the sea. The area of these hills contains 268,494 acres. The formation, like that of Coorg and Wainaad, consists of syenitic granite with veins of basaltic rock, hornblende and quartz, while in some parts half-decomposed laterite underlies the soil. The plateau consists of undulating hills with intervening grassy valleys, thickly wooded ravines, and occasional rocky ridges running up into fine mountain peaks. The Moyaar is the most highly honoured of all the sources of the Kaveri. For it waters the precious plantations of fever dispelling chinchona trees; descending into them from the upper plateau, by a magnificent waterfall.

These are the main sources of the Kaveri. They send forth abundant supplies of water in ordinary years, and only need the regulating hand of rulers, possessed of intelligence and forethought, to secure perennial irrigation, and to prevent visitations of famine in the low countries. The action of man is causing one great change around the sources of the Kaveri. The establishment of numerous coffee plantations has given rise to widespread destruction of the primeval forest. Upwards of 60,000 acres of forest have been cleared, and the process has not by any means reached its limit. So that a great change is taking place in the physical condition of these hill districts. On the one hand the destruction of forests gives rise to an increased rapidity of surface drainage. This causes sudden and destructive floods at the outlets of the plains where the change of slope occasions a diminution of velocity, and to injurious freshes in the irrigating rivers, after they have reached the plains. On the other hand the effect of vegetation is to retard evaporation, and to check the rapidity of drainage. Consequently the floods caused by monsoon rains are increasing in violence. The rain water rushes off the surface, instead of sinking into the earth and forming springs.

In almost all countries there is either something to check the rapid flow of the rain water in surface drainage, or else there are disastrous floods. This agency acts as a sponge. It consists either of a large area of forest, or of swamp, or of peat bog, or of a system of lakes, or of artificial reservoirs. In France there is no sponge of any kind to regulate the waters of the Loire, and, consequently, there are frequent and disastrous floods. On the Rhone, the lake of Geneva performs that important duty, and the floods are less violent and not so frequent. The Po and its numerous affluents are under control, because, at their head waters, there are efficient sponges provided by the lakes at the foot of the Alps. The River Ebro, in Spain, has no such moderator, and destructive floods in the country round Tortosa are, consequently, of no uncommon occurrence.

On the Western Ghâts the sponge was furnished by the extensive forests which clothed their sides. When the forests are removed, it is essential to the welfare of the whole Peninsula of India that a system of storing water in large artificial lakes should be substituted. Sir Arthur Cotton urged the necessity of forming such reservoirs on the Nilgiris more than forty years ago. Dr. Balfour has written two valuable papers upon the subject. But nothing has been done. Reservoirs have been proposed in Coorg and Wainaad, and a thorough examination of sites was made on the Bhowani and Moyaar Rivers by Mr. Fraser. Plans and estimates were prepared for a great reservoir on the Manal Kava. Another was proposed at a site about a mile below the junction of the two rivers; another at Palavur, on the Bhowani, where a bund 852 yards long would form an artificial lake 45 miles round, the whole area being now a wild uninhabited jungle. On the Nilgiri plateau, the streams flowing through Love Dale, and from Bishop's Down, unite on an extensive flat, where a lake could easily be formed, capable of holding 70,000,000 cubic yards of water. The construction of reservoirs in the hills is also a matter of great importance for purposes of irrigation. They will relieve the rivers of superfluous water when the floods are high, thus tending to prevent injury to the works, and will furnish supplies for irrigation when the rivers are low, owing to a failure of the usual rains. Every cubic foot of water which passes over a dam into the sea in time of floods, virtually represents so much food for the people recklessly wasted. The storage of water in artificial lakes would prevent this waste. While such reservoirs are the obvious remedy for the evils caused by the destruction of forests, they are also essential to a thorough system of irrigation and to the prevention of famines.

In his book entitled *Our Mountain Ranges*, Mr. McIvor, the late Superintendent of chinchona cultivation on the Nilgiris, has shown that dams for the formation of large reservoirs can be constructed very economically. Water can be made to form its own embankments at less than one-tenth the cost of manual labour. When properly directed, water will move earth in incredible quantities, will carry it to any distance, will deposit it in any shape required, and in the most solid and substantial manner. At a low gradient of 1 in 95, water will carry about 30 per cent. in the form of silt. At a higher gradient the quantity of silt carried is more than doubled. By the silting process bunds may be thrown across valleys to form lakes, which will irrigate hundreds of square miles of country. In 1866 Mr. McIvor's plan was practically tested by throwing a dam across the Devah Shola Valley, on the Nilgiris, for the irrigation of the lower part of a chinchona plantation. This dam contained 6525 cubic yards of earth, and it was completed by ten men in thirty-two days, at a cost of Rs. 80 of labour wages, and a total cost of Rs. 94.

If surplus water was thus stored during ordinary years, instead of being allowed to run to waste, there would be no danger of famines during extraordinary years of drought. The fountains of the Kaveri supply the water, but it must be placed under control and duly husbanded by human agency.

Having thus described the head waters of the Kaveri, we will now proceed to examine the uses that are made of those waters when they come forth from their hilly recesses; and, first, we will return to the river Hemavati, the golden stream sacred to Isvara's spouse.

The waters of the Hemavati are dammed in six places for purposes of irrigation. The first work of this kind is the great Sriramdevara *anicut*, in the Narsipur taluk of the Hassan district, which was originally constructed of rough stone by Danayaka Hebbaraiya, in 1533 A.D. It was repaired during the administration of Dewan Purnaiya (Poorniah), the able Minister of Mysor from 1800 to 1811; but in 1863 it was again breached. Since that time the English have erected a new *anicut*, a little below the former site, at a cost of 28,000*l.* Two channels are led off from it—the Uttara (or North Channel), 30 miles long, on the left bank, and the Dakshina (or South Channel), 12 miles long, on the right bank. The former irrigates 1244, and the latter, which runs through the town of Narsipur, 560 acres. The Madapur *anicut*, 10 miles below Narsipur, has channels irrigating 417 acres. The next dam is the Mandikere, with a channel 25 miles long, on the right bank, irrigating 798 acres of rice land and 172 of garden. This work is believed to be 400 years old. The Hemagiri dam is of equal antiquity. The channel drawn from it is 18 miles long, and irrigates 655 acres of the richest soil. The Akkihebbal *anicut* is composed of two sections, resting on the island of Hospatna, in the middle of the Hemavati River. It is said to have been built in 1087 A.D., and sends forth a channel 8 miles long, irrigating 219 acres. The last dam is the Kalhalli, built in 1396 A.D., with a channel also 8 miles long, irrigating 297 acres of rice land, the whole of which is assigned for the support of the Parkalswami, a guru. The Hemavati is 107 miles long. Its catchment basin covers 1292 square miles, of which the drainage of 662 is intercepted by tanks, or 51 per cent. of the area.

After the Hemavati, the River Kaveri is joined by the stream bringing down the drainage of southern Coorg, called the Lakshmantirtha. This river is crossed by seven dams. The first, called the Hanagod *anicut*, after the village of the same name, is built, like those on the Hemavati, of rough rubble stone, but its strength is greatly augmented by the rocks of the river bed. Its channel, led off from the right bank, runs for 9 miles and then divides into three branches, the Nellur 7, the Hanumantapur 24, and Wudur 20 miles long. The Nellur follows the course of the river, and ends in the Elephant Tank at Hunasur. The other two branches pass through a deep cutting and enter the basin of the Kabbani River. Six tanks are fed by the Hanumantapur in its course; but dense jungles border the channels, and prevent extensive cultivation. The next *anicut* is called Ramenhalli, with a channel flowing for 20 miles, and passing through the town of Hunasur. But it is now breached. The Katte Malalwadi dam is about 4 miles below Hunasur, and from it a channel goes for 14 miles along the left bank, irrigating 280 acres. Next comes the Hangarhalli dam, whence flow two channels, the Seriyur and Husenpur, the former 12 miles long on the left bank, and the latter 14 on the right bank. The Marchalli dam was breached in 1864, and a new one has been constructed. The Sagarkatte *anicut* was built by the Dewan Purnaiya, and gives rise to the Anandur Channel on the right bank, which is 20 miles long and irrigates 725 acres. Lastly, the Cholanhalli dam is thrown across the Lakshmantirtha River about half a mile above its confluence with the Kaveri. It was breached in 1864, but the irrigation under the channel is kept up by the drainage of the Anandur channel, under which it runs for its whole length. The Lakshmantirtha is 64 miles long. Its catchment basin covers 662 square miles, of which 26 per cent. is under the irrigation system. There are few tanks, the system depending on *anicuts* across the river.

The small river Lokani flows into the Kaveri on the left bank before that river reaches Seringapatam, but its sources are not in the ghâts. It is only 27 miles long, with a catchment basin of 175 square miles, of which 54 per cent. has the drainage intercepted for irrigation.

The Kaveri next receives the Kabbani River, bringing with it nearly all the drainage of Wainaad, including the waters of the rivers Nugu and Gundal. The confluence of the Kaveri and Kabbani is looked upon as a spot of pre-eminent sanctity. Here the Kabbani is a fine perennial river, from 150 to 200 yards in width; but at present it only irrigates one stretch of land, on the left bank. The Kabbani is 80 miles long, and its basin covers an area of 1627 square miles, of which 784 are intercepted by tanks. It has no *anicuts*, but its tributaries the Nugu and Gundal have a few across their beds. The Gundal supplies some large tanks, particularly one at Narsipur.

The main river Kaveri itself, after leaving its mountain cradle in Coorg, runs through a deep narrow gorge, with a fall of 60 to 80 feet in the rapids at Chunchankatte. It then takes a short bend to the north to meet the Hemavati, turns south-east until it receives the Lakshmantirtha, branches to form the island of Seringapatam, and soon afterwards unites its waters with those of the Kabbani. The average breadth of the Kaveri in Mysor is 300 to 400 yards as far as the confluence with the Kabbani, the maximum flood discharge being 239,000 cubic feet per second. The bed is for the most part composed of granitic rock; but in some places the bed is laid out in vegetable gardens of melons and cucumbers during the dry season. The first fresh takes place in June, and the water begins to subside in August. Along the great part of its course the Kaveri is bordered by a rich belt of wet cultivation, but there are some gaps owing to the deficiency of water supply.

The river Kaveri is dammed by no less than twelve *anicuts* within the State of Mysor. The two first occur in the Hassan hill district. The first, in the Mysor district, is a long, straggling structure of rough stone, 570 yards long, by 4 yards broad, called the Alale Katte *anicut*. It supplies the Saligram Channel on the left bank, which flows for 13¾ miles, and ends in a small tank. The next is the Hanumanta Katte, giving rise to the Mirle Channel, on the left bank, which divides, after a mile, into three branches, the Hosa-nala 6, the Hiri-nala 12, and the Attikatte, 6 miles long. The Hosa-nala receives the drainage of the Saligram Channel. The drainage of the three branches unites in the Hempapura Channel, which, after a course of 16 miles, ends in the Gullige tank. All these dams and channels were constructed by Hindu Rajahs of Mysor. Two hundred yards lower down the river there is another dam, called Chunchankatte. It stretches tortuously across the bed, a few hundred yards above the Chunchan Falls, which are 80 feet high. The Ramasamudram Channel is led off and has a course of 26 miles, feeding the large Wodayarpur tanks, and ending near the Ramanakere tank. The cultivated area receiving from this channel is 1300 acres. The dam and channel are also due to the Hindu ruler, Chikka Deva Wadeyar. Next comes the Adagur Katte *anicut*, giving rise to the Tippur Channel. It is composed of two separate dams of rough stone, resting on an island in the middle of the river. The channel has a course of 22 miles, and at its end joins the Anandur by means of an aqueduct thrown across the Lakshmantirtha River. These works were constructed by a Poligar chieftain, named Govinda Nayaka. The next *anicut* is a low, straggling structure of stone, 776 yards long, near the village of Sitapur, called Madad-katte. From it the finest channel in the Mysor country is led off, called the Chikka Deva Raya Sagar. It runs for 72 miles on the left bank of the river, irrigating an area of upwards of 10,000 acres, and at its end feeds four important tanks, the Hosahalli, Kodagalli, Madagalli, and Bannuru. Both dam and channel were constructed by the Hindu ruler whose name the channel bears. A few miles below the Madad-katte is the Deravaj *anicut*. It has a channel 8 miles long, on the right bank, which flows for 38 miles, and irrigates 5300 acres. It also works the sugar and iron factories at Palhalli. The eighth channel drawn from the Kaveri in the Mysor district is the Bhangar Doddi, the dam being thrown across the Paschima-vahini branch of the river. The channel, after crossing the island of the same name, is led over a second branch of the Kaveri, into the island of Seringapatam, by means of an aqueduct. It then divides into three branches, one entering the fort of Seringapatam by an underground duct, the second terminating at the Darya Daulat garden, and the third at the Lal Bagh, near the tombs of Haider-'Ali and his son, Tippu Saib. Next is the Ramaswami *anicut*, giving rise to two channels, the Ramaswami, on the left, and the Rajparamesvari on the right bank. The former has a course of 31 miles, irrigating 6500 acres. The latter runs for 30 miles, and irrigates an area of 2900 acres. The last dam on the Kaveri within Mysor is the Madhava-mantri, near the celebrated sand hills. It is said to date from 894 A.D. After two miles the channel from it divides into three branches, whose total length is 18 miles, irrigating 2250 acres. For the most part these works on the rivers are very ancient. The stone *anicuts* raise the water-level to the required height, the lowest on the Kaveri being 7 feet and the highest 23 feet. The channels have regulating sluices at their heads, escapes for getting rid of surplus water, silt sluices, for creating a local scour to aid in clearing the channel, and irrigation sluices, for distributing the water. The 305 miles of channels from the Kaveri alone irrigate 70,500 acres.

After its junction with the Kabbani, and from that point to the falls, the Kaveri swells into a much larger streams. Here it reaches the ancient city of Talkad, which is almost completely buried between hills of sand stretching for nearly a mile in length, only the tops of two pagodas being visible. The Kaveri is then joined from the south by the river Suvarnavati or Honnu Hole (both words meaning the "golden stream), and thence forms the boundary between Mysor and Coimbator for 40 miles. The Honnu Hole is crossed by three permanent dams. The Gajnur *anicut*, giving rise to the Bandigeri Channel, is at present out of order. The Hongalvadi *anicut* feeds the large Ramasamudra tank, near the town of Chumrajnagar. The Ganganur *anicut* feeds 6 channels and 26 tanks. There are also temporary dams, constructed, when the water is low, of stakes, mats, and sand. From these several smaller channels are taken. At Sivasamudram the Kaveri forms an island, and the two channels are precipitated down the picturesque falls of Gagana Chukki and Bar Chukki. The reunited stream has a bed 300 feet lower, and passes eastward through a wild gorge, receiving the rivers Shimsha and Arkavati from the north.

Thus the Kaveri, with its mountain tributaries, spreads fertility over the otherwise arid plains of Mysor. Two of its tributaries drain the country to the north, but do not derive their sources from the ghâts. Of these the Shimsha is one of the most important rivers in Mysor. Its sources extend over a great part of the centre of the province. It flows through the Kadaba tank, which it forms, joins the Naga stream which feeds the Turvekere tank, and the Nagini from the Kunigal tank. These, and three others supplied by its feeders, are all on the largest scale; and the lately reconstructed Muddur *anicut* is the best modern work of the kind in Mysor. The Shimsha is 73 miles long, its catchment basin covers 3224 square miles, of which 2639 are intercepted by tanks. The other river is the Arkavati, which flows through the Bangalore district from north to south, receiving the drainage of all the country between the central water-parting of Mysor and the western chain of hills. It has a course of about 63 miles. The area of its basin is 1659 square miles, of which 519 are intercepted by tanks.

The whole Kaveri system in Mysor has a total length of 646 miles; the catchment basin has an area of 11,295 square miles, 5769 of which are intercepted by tanks.

In Mysor the streams which gather from the hill-sides and fertilise the valleys are, at every favourable point, embanked so as to form tanks, the outflow of one at a higher level supplying the next lower, and so on down the course of a stream, at a few miles apart. There are 37,682 such tanks in Mysor, the largest of which, the Súlekere, is 40 miles in circumference. Most of the open country in Mysor is undulating, so that the channels from tanks and *anicuts* command but little ground, and hence the vast number of works that have been constructed. Clay is rare, and good puddle is wanting, so that leakage is common. But Mysor is highly favoured in the matter of stone. The gneiss rock splits readily into large sheets 2 inches thick, by simple application of heat to the upper surface. It can easily be divided into slabs for *anicuts*, tank waste weirs, sluices, and overfalls.

The rulers and people of Mysor have, in ancient times, worked with patient and intelligent industry to secure the benefits of the water flowing from the ghâts. To such an extent has the principle of storage been carried, that it would now require some ingenuity to discover a site within this great area suitable for a new tank.

The bunds of Mysor tanks are of every variety of length, from a quarter of a mile to a mile and a half. They are, as a rule, faced with a rough stone revetment, backed with loose rubble stones. The breadth of the earth-work is proportioned to its height, which is greatest in the centre of its length. An ordinary bund is about 12 feet broad at the top, 60 at the bottom, and 18 feet high. Each tank is supplied with one or more sluices, by which the water can be let out on the fields at pleasure. Their position is generally on a level with that of the bed of the tank. A tank sluice consists of a 2-yard-square brick or stone cistern, to keep off the sand at the front of the bund, with one or more valves or plug-holes in a stone at the bottom. The valve is attached to a long pole, and is held in an upright position by two or four vertical stone pillars to which horizontal stones are attached, through a hole in the centre of which the valve rod works. The pressure of the water upon the top of the valve keeps it sufficiently tight, when lowered into the valve-hole, to prevent the escape of the water. At the rear of the bund another cistern is built, with shutters, to admit of water being turned off in the desired direction. The two cisterns are connected by a tunnel, about 2 feet high. In addition to these sluices, each tank has one to four masonry outlets, called *codies*, by which the surplus water escapes to other tanks below.

The art of tank-digging belongs to a particular caste called Wuddas, or Wuddaru, whose customs and peculiarities are described by Dr. Buchanan.* They are a tribe of Telinga origin, although they are scattered all over the peninsula. They dig wells, canals, and tanks, make roads, and trade in salt and grain.

Although there must have been great efficiency in the irrigation system during the times of the early Hindu rajahs, who showed a marvellous grasp of the requirements of the country, and a most enlightened perseverance in continuously proceeding with the necessary works; yet it is said that the tank management fell into great disorder during the Muhammadan usurpation of Haider and Tippu. Under the restored

---

* *Mysore*, i., p. 216 (2nd ed.).

Hindu rule, from 1800 to 1832, they fell out of repair in many instances. The area actually under wet cultivation is the best test of the efficient state of the reservoirs, and it is one which tells in favour of British rule. The number of acres under wet and garden cultivation, from tanks and channels, was 1,705,150 from 1838 to 1842, 1,849,759 from 1842 to 1847, 2,087,929 from 1848 to 1852, 2,160,309 from 1852 to 1857, and 2,169,040 from 1858 to 1862. At the same time the tanks are not in a satisfactory state. There has, it is reported, been a want of a general plan of action under scientific direction. Many tanks are breached or in need of thorough repair, and the villagers themselves do not attend properly to their duties connected with tank conservancy as established by local custom. Greater attention is, however, being paid to the conservancy of tanks by the villagers, who are expected to fill up inequalities caused by rain on the bunds, to check the growth of weeds, to clear out tank sluices and distributing channels, to turf parts of the bunds acted upon by the waves, and generally to preserve the works by that constant care and attention which residents on the spot can alone exercise.

It is very important that water, used for irrigation, should be correctly applied. Paddy fields must be flooded, but in the case of most crops water should be kept in circulation. Except with fields of rice, irrigation should be effected by the water being conducted in channels between the rows, the moisture reaching the roots by percolation. If water is allowed to stand long upon the surface, the land becomes sour and water-logged, fever is the consequence, and the soil gets sterile and worthless.

When the Kaveri River leaves Mysor it is diverted from its course towards the sea by the Shervaroy Hills, and pursues a nearly south direction for 50 miles. It leaves behind it a vast region where thousands of acres are, through its influence, converted from arid desert into rich gardens and cultivated fields. It flows onwards to another region where its remaining waters again create a rich and fertile expanse of rice cultivation covering many square miles. In this north and south part of its course, the Kaveri receives the united waters of the Moyaar and Bhowani from the Nilgiris. The former river presents a singular instance of the action of a river in deepening its bed. The Moyaar ditch, as it is called, is 100 feet deep near the upper, and 800 feet at the lower end, the sides being very steep, and the land at the same level on both sides.

The Kaveri next receives the Noyel River flowing from Coimbatur and supplying the tanks in that district, and the Ambravati draining the northern slopes of the Anamallai and Palnai Hills. It then approaches Trichinapalli, and comes to those works which enable its waters to convert the delta into one vast irrigated garden.

It is said that the native system of irrigating the delta of the Kaveri dates from the reign of a certain Rajah Viranum in the second century of our era. It consisted of channels of supply proportioned in dimensions to the area of the tract dependent upon them for irrigation, which were cut from the river bank, and sometimes supplied with head sluices of masonry. The levels of the heads were so arranged as to command a full supply of water in moderate floods, which was led to the fields by infinite numbers of smaller channels of distribution. When the level of the river was too low for the supply of the channels, the construction of a permanent masonry or a temporary earthen dam was resorted to, to raise the water to the requisite height. Subsidiary to the general plan of river irrigation, tanks were largely employed on a gigantic scale. The embankment of the Punari tank in Trichinapalli was 30 miles long, that of the Viranum tank about 10 miles long. The old native work was at the lower extremity of Seringham island and was called the Grand Anicut. It consisted of a solid mass of rough stones of moderate size, 1080 feet long and 40 to 60 broad, stretching across the bed of the Kaveri in a serpentine form. This was a favourite mode of construction in native hydraulic works, adopted under the impression that as all natural water channels are tortuous, all artificial works in water ought to be the same. This *anicut* was built upwards of 1600 years ago.

Tanjore, including the delta of the Kaveri, was ceded to the English in 1801. At the head of the island of Seringham the main river is subdivided into two channels, the southern branch retaining the name of Kaveri, and the northern being called the Kalerun. The flood discharge is 472,500 cubic feet per second. The fall above the point of separation is 3½ feet per mile. This continues for 70 miles down the Kalerun branch, gradually lessening to 2 feet, and further on to 1 foot in a mile, while the Kaveri branch is 5 inches less per mile than the Kalerun. The latter channel had a larger volume, a more rapid slope, and a more direct channel than the Kaveri. The natural result was the progressive deterioration of the Kaveri by the formation of deposits at its head, and the consequent diversion of the great body of the main stream into the northern channel. In 1804 Captain Caldwell arrived at the conclusion that if effective measures were not adopted to rectify, by artificial means, the differences between the two branches, the inevitable result must be the annihilation of the Kaveri as an irrigating stream, and the consequent ruin of Tanjore. The old *anicut* was then raised considerably, but the root of the evil, at the separation of the two branches, was left untouched. Between 1830 and 1836 various under-sluices were constructed in the old *anicut*, and on the left bank of the Kaveri, through which sand was to be swept during freshes into the Kalerun, the bed whereof was lower than that of the Kaveri.

The name of Sir Arthur Cotton is inseparably connected with these works. His plans were submitted in 1834, and sanctioned in 1836. Before the construction of the new works the area of irrigation dependent on the Kaveri was 504,900 acres, and on the Kalerun 165,000 acres. There was too much water in the Kalerun, and too little in the Kaveri. The problem was to throw the excess in one branch into the bed of the other; and this was the great object of Sir Arthur Cotton's plan.

He proposed to build a masonry *anicut* across the Kalerun, the crown of which should ensure about half the supply of that branch between December and January, the average state of the river, passing into the Kaveri. The *anicut* was to be 750 yards long, divided into three parts by two islands. The northern portion was made 7 feet 4 inches, and the remainder 5 feet 4 inches high. The body of the dam is of brick, capped with cut stone, and the thickness throughout 6 feet. This dam rests on a foundation of masonry 3 feet deep, built on three lines of wells, 6 feet in diameter, sunk to a depth of 6 feet in the sandy bed of the river. In rear of the dam there is an apron of masony 21 feet broad, covered with cut stone 1 foot in thickness, carefully laid in hydraulic cement. Below the apron a mass of rough stone protects the junction of the apron and river bed. Twenty-two sluices are distributed throughout the length of the dam, their sills being on the same level as the bed of the stream, to afford free passage for the sand, and to prevent the bed of the Kalerun above the dam from being raised by deposits. They failed to effect their purpose, however, and the *anicut* raised the bed of the Kalerun above it. In fact, these sluices only furnished a waterway of 44 feet in width, for scouring out the bed of a channel nearly 2200 feet broad. Their influence was practically unfelt.

In 1839 Colonel Sim reported that nothing less than complete openings from 6 to 12 feet wide would produce the desired effect. In 1843 such sluices were established, giving a total width of 129½ feet. The Kalerun was made the general escape channel for the surplus volume of water in the Kaveri. The first outlet was established 2 miles below the separation, and consisted of an under-sluice having twenty openings, giving a waterway of 120 feet. The next escape, a little lower down, was a waste weir having a waterway of 450 feet. The third was the ancient *anicut*, having a waterway of 1050 feet, and ten sluices at low levels giving 60 feet more. The fourth escape is 6 miles below the old *anicut*, being a weir of 300 feet of waterway. A sluice of twelve outlets, about 10 miles beyond, forms a fifth outlet. The sixth and last is another sluice with six vents, 12 miles lower down. Eastward of this several main channels leave the river, and pass to the sea, supplying the means of draining off the portion of the volume of the river undisposed of by the escapes above.

The effect of the Kalerun dam was to deepen the bed of the Kaveri, and cause heavy deposits in the Kalerun above the dam. There was danger that an inversion of the former relations of the two branches would arise, and measures were adopted to obtain entire control over the bed of the Kaveri.

Colonel Sim recommended the lowering of the central portion of the Kalerun dam, and his plan was adopted in 1843. This was done for a length of 700 feet, and of course added considerably to the volume of the Kalerun. His advice to construct a masonry regulating dam across the Kaveri was also adopted. A bar of masonry 650 yards long was carried across the mouth of the Kaveri in 1845, the level of the crown at the central portion being the same as that of the river bed. The effect has been a regularity of current and decrease of violence in the Kaveri, and a clearing of the Kalerun. The means adopted have proved sufficient to control the two streams in a most satisfactory manner.

The Kalerun is the grand drainage channel of the delta, and only in a minor degree an irrigating river. The Kaveri branch is essentially a channel of irrigation only. Towards the sea the main line is almost lost amongst the immense number of minor channels. All the irrigation channels are solidly and substantially embanked. The dam across the Kaveri and Vennar (one of the principal channels) is a fine work, constructed in 1848. In order to regulate the supply for South Arcot, an *anicut* was thrown across the Kalerun, in 1836, 70 miles below the head at Seringham, consisting of a bar of masonry, 8 feet high and broad, with a hollow space (3 feet by 4 feet) in the centre, arched over, and filled with rammed sand. It has 23 under sluices, an apron of masonry in the rear, and is 1901 feet long.

The area of the Kaveri delta is about 2760 square miles, and the system irrigates 835,208 acres, with a revenue of 353,033*l*.

The Kaveri is an example of a river receiving water from both monsoons, and the floods of which are utilized almost to the fullest possible extent after reaching the plains. The storage of surplus water in the hills is the measure which is necessary to preserve its catchment basin from the consequences of exceptional years of drought.

Within the same parallels of latitude, between the eastern limit of the Kaveri basin and the sea, there is a region which receives no water from the south-west monsoon, and is entirely dependent on the rains from the Bay of Bengal. It includes the basins of the Vellaur (4500 square miles), the Penar (6200), with a length of 245 miles, and the Palar (6300), with a length of 220 miles. They embrace the districts of Salem, North and South Arcot, and part of Chengalpat.

In the Carnatic the slopes of the country are much less than in Mysor, not more than 4 feet per mile, while in Mysor they are from 10 to 20 in the flat parts. Hence the channels from tanks and *anicuts* of the Carnatic command a much wider extent of ground. The rainfall of Madras is only 46 inches in the year, and the sources of the rivers do not extend, in any direction, to points where the fall is greater. But in no part of India have more strenuous exertions been made, from the earliest times, to utilize the small amount of rainfall that is available.

In South Arcot an *anicut* is built across the Vellaur River at a place called Pelandorai, with a supply channel on the right bank, regulated by a head-sluice, and connected with subsidiary channels conveying water for the irrigation of fifty villages. These works were only begun in 1870, but they are now completed. In North Arcot an *anicut* is thrown across the River Palar at the town of Vellore. It is 2600 feet long, and a channel is taken off from either bank to irrigate about 37,672 acres. The original work was constructed in 1855, but was damaged in 1874, and has since been restored. The northern part of North Arcot is drained by a tributary of the Palar River called the Poinay. Its waters are utilized chiefly to feed tanks, of which there are no less than 40,000 in this district. In 1863 several channels were cut from the left bank to feed tanks, and extensions have been projected. The tank system of the Carnatic is indeed most important, and it is purely of native origin. In 1853 no new tank had been made by us, though many had been allowed to fall into disrepair.

The tanks are formed in various ways, according to the accident of the ground. Valleys are taken possession of, and the natural drainage lines flowing through them are checked by embankments sufficiently long to close the gorges, and high enough to retain a volume of water proportioned to the areas of irrigation situated below. Descending steps of land are occupied by a succession of reservoirs, the higher feeding the lower from its surplus supply. Dry basin-shaped hollows have banks carried round their ridges, and supplies introduced from rivers by means of special channels. Long slopes, where the fall is considerable, have portions embanked more or less regularly on three sides, and the included space forms a storage area for such volume of water as local wants may call for. The Ponairi tank, in Trichinapalli, had an embankment 30 miles long, and an area of 60 or 80 square miles, now lost to the community. The Viranum tank has an area of 35 square miles and an embankment 12 miles long, still in full operation, after an existence of fabulous duration.

The Chembrumbakam tank, about 14 miles from Madras, is one of the finest in the Presidency. It is very picturesquely situated, and looks like a natural lake, but is purely artificial. Before its enlargement it had an embankment more than 3 miles long, 28 feet in thickness, and 16 to 26 feet high, with an area of 4648 acres. It now has an area of 5729 acres, and maintains a sheet of rice cultivation nearly 10,000 acres in extent. The Kaveri-pauk tank, in North Arcot, is supplied from the Palar River, and is of great antiquity. The embankment is 3¾ miles long, and it has an area of 7 square miles. The bank is rivetted along its entire length with stone, sometimes in very massive but roughly hewn blocks. The supplying channel is about 7 miles long, and the irrigated area is nearly 7700 acres. The most formidable cause of injury to tanks is the action of waves on the embankments during gales. This action is counteracted by long slopes on the water face of the bank, and protecting coverings of rough stone. Most tanks are supplied with an outlet called *calingula*, generally of masonry built in the bund near one end. It is so much lower than the bund itself that any superabundant water can pass over it; and is closed towards the end of the rainy season, so as to keep the tank quite full. This is done by means of straw and turf, the crown of the *calingula* being generally provided with a row of rough granite posts 3 or 4 feet high, to support the wall of turf built up in front.

Thus are the rivers and streams, which would otherwise pour their waters uselessly into the sea, made to yield up their life-sustaining treasure by human industry and skill; and thus the whole physical aspect of vast areas of country is entirely altered. In India, if the water furnished by the monsoons is ever utilised thoroughly and completely, there will be no more famines; and the statesman who, through want of knowledge of the subject, speaks disparagingly of the value of works of irrigation, incurs a grave responsibility. Their importance cannot be over-estimated. Proceeding northwards, we next propose to consider the still more extensive basin of the Krishna River, including also that of the Pennair.

C. R. M.

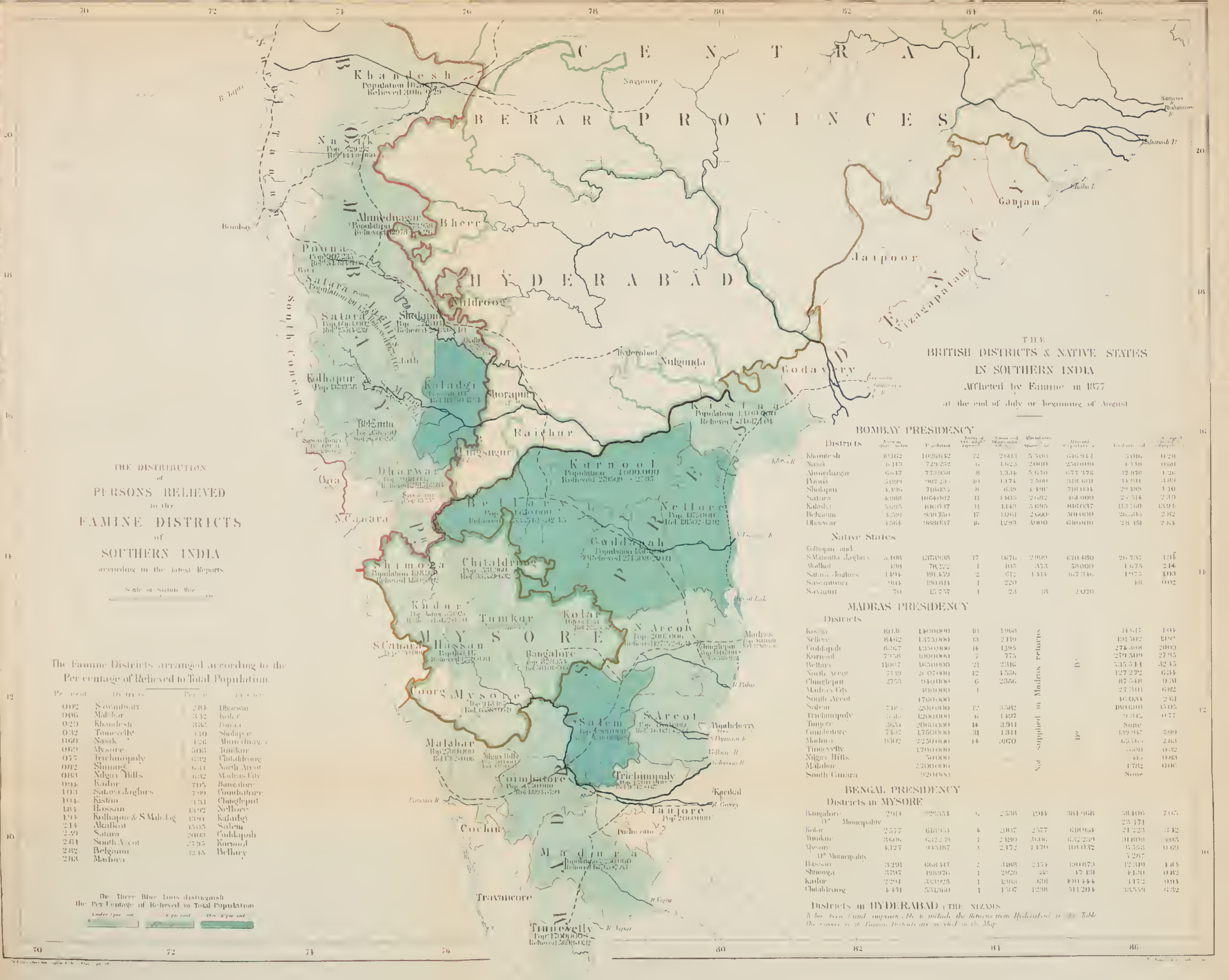
THE FAMINE IN INDIA. 1876-1877.

The map which accompanies our present number shows the extent of the calamity which has aroused the sympathy of the civilised world, and in a special manner has moved the generous feelings of the English people. The coloured portion represents an area of more than 130,000 square miles, equal to more than four Irelands,* throughout which distress has rested for now more than fifteen months; distress varying indeed in degree, as is shown by the gradations of colour and the explanatory figures on the map, but everywhere serious and increasing in intensity as time went on, and one bad season was succeeded by another. In our own country the rainfall is fairly distributed throughout the year, but in India it is looked for at two seasons and from two quarters. The south-west monsoon strikes the western coast in June. The north-east monsoon, principally affects the eastern portion of the peninsula, and is due at the end of September or the beginning of October. Upon the first, which is also the most important to the country, depends the *kharif* or summer crop; upon the second, the *rabi* or winter harvest. The rains of June and July 1876 were very scanty; so much so that even on the mountains of the Western Ghâts, which receive the full force of the south-west monsoon, and never experience drought, only 86 inches of rain fell instead of the average of 126 inches, and in the plains eastward the usual supply of from 20 to 40 inches was reduced to one of from 3 to 20 inches. With the failure of the October rains the devastation of the country was complete, and famine became inevitable. Measures were at once taken to meet the coming distress. The policy of the Government of India, as expressed by Lord Lytton, was "to give all possible facilities for the transport of grain to distressed districts; to abstain from interference with the grain trade, so long as that trade was active; to give relief wages to the destitute who would labour on useful public works; to relieve gratuitously, under trustworthy supervision, the helpless poor, when the pressure of famine became extreme; and to avert death from starvation by the employment of all means practically open to the resources of the State and the exertions of its officers; but to discharge this duty at the lowest cost compatible with the preservation of human life from wholesale destruction."

The decision of the Government to abstain from interference with the grain trade has been fully justified by the result. Never has that trade in any previous famine been more active. As early as September supplies in great quantity were despatched from Central and Northern India, where fortunately the harvest had been plentiful. In December imports began to arrive from distant provinces, from Bengal and Burma especially, and from Orissa and Ganjam. From the time the distress declared itself to the end of March in the present year no less than 500,000 tons had been imported into Madras alone, and, as might be expected, the great difficulty at first was to relieve the strain upon the railways caused by this sudden demand upon their resources. For some time there was a complete block in the traffic. At Jabalpur and other stations piles of grain bags were kept waiting for days, and the shore at Madras

---

* See the map in our number for February 1874.



THE DISTRIBUTION
of
PERSONS RELIEVED
in the
FAMINE DISTRICTS
of
SOUTHERN INDIA
according to the latest Reports

Scale of Statute Mile

The Famine Districts arranged according to the Per centage of Relieved to Total Population.

Per cent	Districts	Per cent	Districts
0.02	Sawantwari	2.84	Dharwar
0.06	Malabar	3.42	Kolar
0.29	Khandesh	3.83	Poona
0.32	Tinnevelly	4.10	Sholapur
0.60	Nasik	4.26	Ahmednagar
0.69	Mysore	5.03	Tumkur
0.77	Trichinopoly	6.32	Chitaldroog
0.82	Shimoga	6.34	North Arcot
0.83	Nilgiri Hills	6.82	Madras City
0.94	Kadur	7.05	Bangalore
1.03	Satara Jaghirs	7.99	Coimbatore
1.04	Kistna	9.31	Chingleput
1.84	Hassan	13.92	Nellore
1.94	Kolhapur & S.Mah.Jag.	13.94	Kaladgi
2.14	Akalkot	15.05	Salem
2.30	Satara	20.03	Cuddapah
2.61	South Arcot	27.95	Kurnool
2.82	Belgaum	32.45	Bellary
2.83	Madura		

The Three Blue Tints distinguish the Per Centage of Relieved to Total Population

Under 1 per cent — [illegible] 8 per cent — Above 8 per cent

THE
BRITISH DISTRICTS & NATIVE STATES
IN SOUTHERN INDIA
Afflicted by Famine in 1877
at the end of July or beginning of August

BOMBAY PRESIDENCY

Districts	Area in square miles	Population	[illegible]	Towns and Villages under [illegible]	Affected area Square miles	Affected population	Total relieved	[illegible]
Khandesh	10162	1028642	22	2603	5500	636944	3016	0.29
Nasik	6113	729252	6	1623	2000	250000	4338	0.60
Ahmednagar	6647	773938	8	1304	5650	677378	32978	4.26
Poona	5099	907234	10	1174	2500	318601	34801	3.83
Sholapur	4496	718035	8	639	4496	718034	29489	4.10
Satara	4988	1064002	11	1405	2682	461100	24514	2.30
Kaladgi	5695	816037	11	1143	5695	816037	113760	13.94
Belgaum	4590	938750	17	1061	2660	501000	26505	2.82
Dharwar	4564	988037	16	1293	3000	650000	28151	2.84

Native States

Districts	Area in square miles	Population	[illegible]	Towns and Villages under [illegible]	Affected area Square miles	Affected population	Total relieved	[illegible]
Kolhapur and S.Maratta Jaghirs	5408	1378908	17	1676	2909	630480	26737	1.94
Akalkot	496	78222	1	105	373	58000	1675	2.14
Satara Jaghirs	1494	191459	2	612	1444	167346	1975	1.03
Sawantwari	904	190814	1	220			48	0.02
Savanur	70	15777	1	23	18	4020		

MADRAS PRESIDENCY
Districts

Districts	Area in square miles	Population	[illegible]	Towns and Villages under [illegible]	Affected area Square miles	Affected population	Total relieved	[illegible]
Kistna	8030	1400000	10	1968	Not supplied in Madras returns		14617	1.04
Nellore	8462	1375000	13	2119			191502	13.92
Cuddapah	8367	1350000	14	1195			274308	20.03
Kurnool	7358	1000000	7	775			279509	27.95
Bellary	11007	1650000	21	2316		D°	535544	32.45
North Arcot	7139	2007000	12	4536			127272	6.34
Chingleput	2753	940000	6	2356			87548	9.31
Madras City		400000	1				27301	6.82
South Arcot		1760000					46034	2.61
Salem	7484	2000000	12	3582			300610	15.05
Trichinopoly	3546	1200000	6	1437			9342	0.77
Tanjore	3654	2060000	14	3911			None	
Coimbatore	7432	1750000	31	1311		D°	139947	7.99
Madura	9502	2250000	14	5970			63676	2.83
Tinnevelly		1700000					5409	0.32
Nilgiri Hills		50000					415	0.83
Malabar		2700000					1782	0.06
South Canara		920000					None	

BENGAL PRESIDENCY
Districts in MYSORE

Districts	Area in square miles	Population	[illegible]	Towns and Villages under [illegible]	Affected area Square miles	Affected population	Total relieved	[illegible]
Bangalore	2914	828354	6	2538	1914	381968	58406	7.05
D° Municipality							23171	
Kolar	2577	618954	4	2007	2577	610954	21223	3.42
Tumkur	3606	632239	1	2480	3606	632239	31809	5.03
Mysore	4127	943187	3	2172	1470	100032	6553	0.69
D° Municipality							5287	
Hassan	3291	668417	2	3188	2474	190873	12310	1.84
Shimoga	3797	498976	1	2629	282	47430	4130	0.82
Kadur	2294	333925	1	1988	691	100444	3172	0.94
Chitaldroog	4431	531360	1	1507	1238	511204	33559	6.32

Districts in HYDERABAD (THE NIZAMS)
It has been found impracticable to include the Returns from Hyderabad in the Table. The names of the Famine Districts are inserted in the Map.

showed similar signs of the deadlock; added to which, there was some difficulty in effecting the necessary interchange of traffic between the Great Indian Peninsula and the Madras Railway. Government coming to the aid of the Companies, a large number of additional engines were ordered from England or obtained from other parts of India. An officer was deputed to confer with the Companies, and by their energy, and readiness to act upon his suggestions, the accumulations were cleared away, the two lines began to work harmoniously, and grain to the amount of 2700 tons daily was passed smoothly to the districts where it was wanted. But for the railways it may safely be said that it would have been impossible to supply the wants of the people, and therefore to prevent very great mortality. The country roads throughout Madras and Bombay are for the most part fairly good, and for the conveyance of the food from the railways to distant points a system of cart transport was organised. It should be mentioned that at the outset the Madras Government, erring on the side of caution, and fearful that private trade might fail to supply certain districts, purchased secretly 30,000 tons of grain. The alarm which this proceeding produced, when it became known to the grain merchants, was allayed, however, and the error was not repeated.

With regard to relief works, the Bombay Government were the first to see that large works, on which great numbers of people could be employed and efficiently looked after, were preferable to innumerable small local works, under insufficient superintendence, very often of doubtful utility, and tending to demoralise the people by affording them easy work and fair wages close to their homes. In Bombay, therefore, several important irrigation schemes, tanks, and roads were taken in hand; and the construction of a chord line east of the ghâts was commenced, from Dhond to Munmar, to connect the branches of the Great Indian Peninsula Railway, which meet at Bombay, and thereby render it unnecessary for goods and passengers going north or south to pass over two sides of a triangle in order to reach the end of the third side. In Madras it was more difficult to devise large works of this character; but several main lines of road and large tanks were commenced, and the prosecution of the East Coast Canal afforded work to many thousands of people.

It is the experience in famines in India that a very large number of people, either from extreme helplessness, caste prejudice, or unwillingness to reveal their sufferings, refuse to resort to relief works, or are reluctant to do so. It was impressed upon the local officers that these people should be sought out and relieved, and the formation of a system of village relief and house-to-house visitation throughout the country was greatly assisted by the "headmen" of the village communities, the "tahsildars" and the revenue officers, who all possess an intimate knowledge of their respective districts.

To keep within the narrowest limits the enormous outlay involved by a system of relief dealing with millions, was a matter of the most urgent importance, and Sir Richard Temple was deputed on a special mission to Madras and Bombay, to confer with the two Governments, to impress upon them the views of the Government of India, and to assist in carrying them out. His energy and administrative ability were especially useful in Madras, where, owing to the larger area of distress, the difficulties of the situation were far greater than in Bombay. Proceeding from district to district, he everywhere personally inspected the relief operations, and by introducing uniformity of system, placed them on a more satisfactory and economical footing. He considered the wage offered to be excessive, enabling the people not only to support life, but to save money. The petty local works were in every case gladly resorted to by many who were not in actual want; and owing to laxity of supervision, labourers, so called, were in very many cases maintained in idleness. All this Sir Richard Temple, in communication with the Madras Government, was able to rectify. The relief wage was reduced for men from 2 annas (3d.) to 1½ annas per diem, and that for women and children was lessened proportionately. Admission to relief works was strictly limited to those who were in absolute want, and unworthy recipients were discharged. By these means the numbers maintained on the works were reduced in three months from over a million persons to 716,000.

The number of persons unable to work, and, therefore, in receipt of gratuitous relief, has been, and still is, enormous, amounting, at the end of July, to one million in Bombay and Madras, and to 150,000 in the State of Mysore, and increasing steadily up to the end of September. The figures on the map, which include those employed on relief works, as well as persons gratuitously relieved, give the following totals:—For the end of July—Bombay, 298,675; Madras, 1,984,094; Mysore, 199,634; or in all, nearly two millions and a half. A fortnight ago, with the large diminution which followed the recent rainfall, the numbers were considerably over 2¼ millions. The price of food grains varied in different parts of the country, but generally it may be said that they were from three to nine, and in some places ten times dearer than in ordinary years.

In our number for February 1874 (p. 441) we gave some account of previous visitations, as well as of the principal features of 1874; and in May of the present year (p. 112) we referred to the main principles of famine administration. It will not, however, be out of place to refer briefly to past famines, on the present occasion. The first thing that is apparent is their terrible frequency, and the impartiality with which they visit in turn every part of India. In 1860-61, 25,000 square miles in the North-Western Provinces suffered from the severest drought. In 1866, we had the Orissa famine, during which it is computed that one-fourth of the population died. In 1868 the collection of native states included in Rajputana, was affected over an area of 100,000 square miles. From hunger and disease, no less than one million and a quarter of the inhabitants are said to have died; and in Marwar, a pastoral state, where there were, before the famine commenced, 2,250,000 head of horned cattle, whose united value may be estimated by the fact that a young and unbroken pair realise from 8*l.* to 25*l.*, three-fourths of these perished, and the country was left with one-fourth of the number of cattle required for agricultural purposes. Truly might the

Political Agent write—"The famine will paralyse the energies of the country for years to come, and a long repose will be needed before Marwar will recover the heavy losses to her material prosperity caused by this fearful calamity." In 1874 Bengal suffered. Some notion of the check to the country's progress caused by these frequent famines is gained by statistics furnished by Colonel Baird Smith. In 1837 the North-Western Provinces were affected by drought over about the same area as in 1860. The average annual revenue of the Agra Division before that year was 750,000*l.*; five years after it was 625,000*l.*; ten years later it was 700,000*l.*; and in 1860 it was still only 715,000*l.* The total loss in revenue in this one division during twenty-two years may, therefore, be reckoned at 1,328,500*l.*, representing a loss of agricultural property of not less than 8 to 10½ millions sterling.

It is impossible to realise to the full extent the amount of suffering and financial disaster which have been averted by the last fortnight's rainfall in India. It has come at a time when the deepest gloom was settling upon the country, and when there was every reason to fear not only a recurrence of famine in the portions already afflicted, but a failure of the winter crops generally throughout the whole of India, with the exception of Bengal and Assam. The north-east monsoon was overdue, and little rain had fallen in Northern India. The people of Bombay and Madras would have had to encounter a second year's famine with stocks and capital exhausted, and with the knowledge that the supply of grain which had come to them from Northern India could not be expected to continue. The whole burden of their support, therefore, would have fallen upon the Government of India, and the resources of the Empire would have been taxed to the utmost to accomplish the task. Happily these fears have been set at rest; but the danger we have escaped, no less than the actual experience of the last twelve months, ought to be taken to heart by the Government, who has committed to its keeping the fortunes of 240,000,000 of people. Without attempting to dwell upon the numerous causes which contribute to make drought in India so terrible a scourge, we may well conclude, in the words of Colonel Chesney, that "till the danger of famine has been guarded against to the fullest extent, the English in India may replace anarchy by peace, and may distribute equal justice and remove ignorance, but it cannot be said that they have fulfilled their whole duty by the people of that country."

KWATAH (QUETTA) AND THE AFGHANS.

A series of letters, signed "T.," have lately appeared in *Allen's Indian Mail*, on "Quetta," so-called, which I have read with some interest, particularly No. IV.; and, with your permission, I will say a few words on the same subject, which may tend to remove some misunderstanding and correct some errors.

It is not surprising that the writer of the letter in question has found a map of the boundaries of Afghanistan "in which Quetta and the whole valley of the Shahdezee Lora (Shawl) is included in Afghanistan; indeed, Mustoong is also coloured as belonging to the Afghans." He, doubtless, is aware how the boundaries in Elphinstone's map are coloured. In that map "Quetta" and the "district of Shawl" is included in Afghanistan, together with part of the Dasht-i-Be-Daulat, as far south as Sar-i-Ab; but Mastang is included in Baluchistan. This is not to be wondered at, for more reasons than one. The tract in question *is part of* Afghanistan, and is peopled by Afghan clans of the great tribe of Kakar, while south of Sar-i-Ab, the people are Baluchis.

The chief town of the district of Shal is, correctly, called Kwatah—an Afghan word—with the peculiar Afghan ṭ, which sound is obtained by reverting the point of the tongue to the palate, and is similar to the Sanskrit ṭa. The word signifies "a mound," "a heap," "a pile of earth, stones, or rocks," as given in my Afghan Dictionary; and any one who has ever seen the place, or seen a view of it, must have perceived, at a glance, the appropriateness of the name.

That Shal, or Kwatah, "*has been* included in Afghanistan" is not to be wondered at. The district, as before noticed, is peopled by Afghans; and the true south-eastern half or portion of the boundary of the Afghan country is clearly defined by a range of mountains somewhat in the shape of a bow, with the apex to the south, stretching from Dajal, near the Indus, in the southern Derah-jat, to Sar-i-Ab. All the people north of it are Afghans: all to the south Baluchis.

Elphinstone says—"Shawl is inhabited by a tribe of Caukers called Cassye (Kasi Kakars); but, as it was granted by Ahmed Shauh to Nausser Khaun, the Prince of the Beloches, it is no longer to be considered as a part of the Afghaun country." This is not quite correct: the tract in question was only placed *temporarily* under the control of the Baluch chief by Ahmad Shah, *as a vassal and tributary*, who acknowledged the suzerainty of the Durani Empire; and, up to the downfall of the Sadozi monarchs, that vassalage was observed, and a contingent of Baluch troops was furnished to the Duranis, to the number of 7500 horse and camel sawars, in time of war. The Wazir, Fath Khan, Barakzi, was the last who appears to have coerced the Baluchis for rebellion, when he restored Shah Mahmud to the throne; and when the Sadozis fell, and the Barakzi brothers divided their sovereign's dominions among themselves, the Baluch chiefs seem to have gradually shaken off or weakened the bonds of their Afghan yoke, which the later Barakzis were never after inclined or able to enforce.

The first Nasír (by some called Násir) Khan, Baluch, son of 'Abd-ullah Khan, brother of Mir Muhabbat Khan, who was a hostage in the hands of Nadir Shah, fell into the power of Ahmad Shah on the assassination of Nadir; and the Baluchis, as well as the Hazarahs and Kazilbashis, associated themselves, with the Afghans, in raising Ahmad Shah, Abdali, to the throne of Afghanistan.

In after years, when Humayun Shah was defeated by his brother Shah-i-Zaman near Kal'at-i-Ghalzi, Humayun fled to Nasir Khan for shelter; but the latter hastened to inform Shah-i-Zaman that he had only received Humayun, and treated him honourably, as a member of the suzerain's family; that he would be answerable that Humayun should not commit any hostile act against the Shah while in his territory; and that he would observe his own loyalty faithfully as he had ever done. Shah-i-Zaman, who trusted to his good faith, made no further demand.

Soon after Nasir Khan died, and his eldest son, Mahmud, being quite a child, a brother's son of Nasir Khan's usurped the chieftainship, and, soon after, began to intrigue with Humayun. Subsequently, Humayun left the Baluch territory, and the Hafiz* Sher Muhammad Khan, the Mukhtar-ud-Daulah, was sent by Shah-i-Zaman with an army to chastise the rebel and reinstate Nasir's son. He defeated the Baluchi rebels in a pitched battle, entered Kal'at-i-Baluch, or Kal'at-i-Brahui, as it is also called, to distinguish it from Kal'at-i-Ghalzi (there is no such place as *Khelat*, I beg to observe, but there is another Kal'at, namely, Kal'at-i-Nadiri, in Khurasan), the young chief was restored, and was taken back to do homage to the Shah, which he did; was received with great favour, and was dismissed with a rich dress of honour; and up to the year 1213 H., A.D. 1798-99, when one of my authorities wrote, this chief, Mahmud Khan, was still living, and was loyal to the Durani monarchy.

The same writer states that the dominion or state of Baluchistan, at that time, extended from the frontier of Sindh to within 15 *kuroh* of the Maskat territory, and from Mastang to the ocean.

Why does the Amir Sher 'Ali Khan, Barakzi, look upon our recent occupation of Kwatah with hostile eye, and as a menace? The answer is contained in another question: Why was the mission under Sir F. Goldsmid, K.C.S.I., appointed to settle disputes between the Persians and Afghans in Sistan, and how were they settled? The Persians claimed Sistan as a province of Iran from ancient times, and asserted that it was only lost during the Afghan conquest of Persia, and that they had very recently reconquered it. The Afghans claimed it as part of the Durani empire by right of Afghan conquest, although Sher 'Ali is but the son of one of the Barakzi brothers, who overthrew the Durani empire and appropriated its States among themselves. Here Sher 'Ali's claims were allowed, and the Persians have had to give up great part of the province of Sistan to the Afghans. Now, if right was on the side of the Afghan ruler in that case, how much more so is it in this?

I have not heard that Sher 'Ali has actually laid claim to Kwatah and its dependencies; but I should imagine that he does lay claim to it, hence the hostile feeling which has arisen on the part of the Afghan Government towards us. Thus, in occupying Kwatah, we have occupied what really does not belong to the Baluch, save and except as long as the Baluch chief acknowledges the Afghan suzerainty, and observes the compact for which that district was assigned—compacts and treaties, however, in these enlightened days, are but waste paper, according to some moralists—and the Afghans, who had begun to forget our former hostility towards them (as was proved when Sher 'Ali, the first independent sovereign of Asia who ever did so, presented himself before a Governor-General of India), will not believe that we have occupied Kwatah as friends, but out of distrust, and as a menace.

As to Kwatah being the key to the Bolan Pass, I have always looked upon that idea as perfectly untenable, when the pass can be turned and avoided in several directions, and India could be reached from the west and north, if that were the object, without touching Kwatah or the Bolan at all. Marw, Balkh, and the little States on the Upper Oxus, are the points to be looked after and guarded from Russian intrigue and aggression.

As to Afghan patriotism, I should imagine we have already had some specimens of it. The gallant 'Usmanli Turks were supposed to possess none either. Whatever feuds may exist among the Afghans themselves, only let foreigners assail them, and they will give them similar specimens of patriotism. The Ghalzis, although hereditary foemen of the Barakzis, were the very tribe which, in the disastrous close of our first Afghan campaign, gave us such infinite trouble. We all know what excellent soldiers the Afghans make, as our Panjab frontier regiments amply show.

Never was there such a time and opportunity lost for making the Afghans fast friends and allies against Russia, and the Muscovite designs in Central Asia. With this object, the Afghans would have joined us, in concert with our old allies the Turks, and may possibly do so still, with judicious treatment, as they, in common with all Musalmans, who look upon the Sultan of Turkey as "the Khalifah and Defender of their Faith, and Guardian of the Holy Places," hate the Russians; and they are farther ready and willing to serve us because we are good paymasters, and, hitherto, have kept faith with them.

Such a combination once on foot between the British and the Afghans, in accord with the Porte, and carried out with energy, Central Asia might speedily be made so hot for the Russians that they would be only too glad to betake themselves off, "bag and baggage," to the cool regions of Siberia again—a move somewhat better than the occupation of Kwatah by us. We might, however, do many things with the Afghans as friends and allies: we might, probably, keep a force at Hirat, at Kandahar, and other places—but not at the capital, Kabul—with their sanction, but not act as we did on the former occasion: we must keep strictly aloof from any political interference in any way whatever.

As to the idea "of severing Herat and Kandahar from the ruler of Kabul" (advocated, I believe, in Sir H. Rawlinson's work on *England and Russia in the East*), "and there being no ethnical or national reason against it," I fancy the theory is far easier put forth than the act would be to carry out, and that the Afghan inhabitants would have a word to say on that subject. What has become of over 300,000 Afghan inhabitants dwelling in Hirat and its dependencies, who are of far more account, in a political point of view, than the Tajziks, the Hazarah Mughals, and the Char-I-mak (the Jamshidjis are included among the latter, but General Ferrier makes Baluchis of them), and others of Turkish descent, although double the number of the Afghans?

It is the custom among the Duranis to employ Tajziks and other conquered races in the cultivation of their lands, and, therefore, those people may be considered generally as were the Helots among the Greeks.

---

* Hafiz here signifies one who knows the whole Kur'an by heart.

It is quite a mistake to suppose that the Durani Afghans have only held the lands about Kandahar since "Nadir Shah parcelled them out in the middle of the last century." I will briefly relate how the Afghans first got Hirat into their possession, and how they *again* obtained lands in the Kandahar province from Nadir Shah, premising that it is tolerably well known that they obtained permission to do so, in the first place, from Sultan Shah Rukh, in the latter half of the fifteenth century A.D.

Two hundred and eighty-eight years since, in the last month of 1006 H.—A.D. 1589—Sado was chosen chief of the whole of the Abdali tribe, which was most numerous around Kandahar, the different clans of which had, for a long time previously, been governed by their own immediate heads, who were independent of each other. Shah Beg Khan, who was governor of the province of Kandahar, on the part of the Emperor Akbar, confirmed this election; and, at this period, there were just 12,000 Abdali families settled around Kandahar. After a time, in 1032 H., the Sufi of Persia obtained possession of that fortified city and province, and Sado obtained from that monarch the title of "Mir-i-Afghan," and the grant of the town named Shahr-i-Saffa, north-east of Kandahar. Kandahar was subsequently treacherously given up to Shah-i-Jahan, Emperor of Dihli, in 1047 H., by the Persian Governor, but it was afterwards surprised, in 1059 H., by the Persians, and the Dihli rulers never after regained possession of it. At the time of the revolt of Mir Wais, Ghalzi, and the seizure of Kandahar by him and his tribe in 1120 H., he began to act in a hostile manner towards the Abdalis, who had been in league with him against the Persians; and the Abdalis being very numerous and powerful at this time, and the Persians weak, they commenced pushing their way towards Hirat. Asad-ullah Khan, the descendant of Sado, took Hirat, during the absence of his father, 'Abd-ullah Khan, at Multan, on the 15th of Ramazan 1124 H.—the latter part of 1712 A.D. On his return soon after, the father assumed the title of Shah, and took up his residence at Hirat, and the whole Abdali tribe moved thither; for, as previously mentioned, they were not on good terms with the Ghalzis, and hostilities had taken place between them on several occasions.

In 1133 H., the Abdalis again defeated the Persians, and acquired an accession of territory, including, among other places and districts, Ghurian, Badghais, Kausiah, Tun, Tabas, Ka-in, Isfarain, and Farah.

When Nadir Shah invested Hirat in 1144 H., for the second time, the Ghalzis sent a force to aid the Abdalis—another specimen of Afghan patriotism. Nadir allowed Allah-Yar Khan, the head of the Sadozis, who had been deposed by Zu-l-Fikar Khan, to hold Hirat again, subject to certain conditions, but Allah-Yar Khan almost immediately afterwards became hostile, and Hirat was finally taken from him. The Ghalzis had again aided the Abdalis in this affair. Nadir took possession of Hirat, a body of Abdalis was enrolled in his army, and 60,000 Abdali families were removed from thence to lands about the Mashhad-i-Mukaddas Abiward, and as far as Simnan and Nishabur in Persian Khurasan; and cattle were given to them to enable them to cultivate the lands in question.

The Abdalis in Nadir's army, under 'Abd-ul-Ghani Khan, behaved so well at Baghdad, in the campaign against the Turks in 1145 H., that he declared he would grant any request they might make him. The request was that he would release the 500 Abdali families detained as hostages, and restore the Abdalis to their ancient lands about Kandahar when he should take it from the Ghalzis. This, I trow, was some proof of patriotism and love of country, of which virtues I have myself met with many strong proofs in individual instances.

When in 1150 H.—A.D. 1733—Nadir took Kandahar, the Ghalzis were transferred to the tracts in Khurasan, whither the Abdalis had been previously removed from Hirat, and the Abdalis were allowed to return to Kandahar again. Twelve thousand ploughs, to each of which were attached sixty *bigahs* of land, out of the lands of Kandahar and its dependencies, were granted rent free for ever to the Abdalis, but a contingent from that tribe was embodied into Nadir's army as before. Serving with that contingent of his tribe was Ahmad Khan, Abdali, afterwards Ahmad Shah—the Pearl of the Duranis—the founder of the Durani monarchy. The walls of Kandahar were razed, and the new city of Nadirabad was founded.

There are still to this day some 10,000 or 12,000 Hotaki Ghalzis dispersed in various parts of the Persian empire.

Thus, it was not that "the lands were parcelled out in the middle of the last century" for the first time, for the Abdalis had previously held lands therein from the time of Shah Rukh. On the foundation of the Durani monarchy, Hirat, as a matter of course, was again taken possession of, and, with the exception of a short occupation by the Persians very lately, it has ever since remained in possession of the Afghans.

What has happened since this very recent occupation of Kwatah? Two officers of Engineers have already been murdered, and now we hear from the *Dihli Gazette* that "the Gurkah Battalion at Derah are ordered to hold themselves in readiness for immediate service, it is supposed in *Khelat* (Kal'at), owing to recent news from that quarter." We have not yet seen, I fear, the last of this mistaken move.

H. G. Raverty, Major,
Bombay Army, Retired.

THE ISLAND OF PERIM.[*]

The Island of Perim is situated at the entrance to the Red Sea, in latitude 12° 40′ 30″ N. and longitude 43° 23′ E., being distant from the Arabian coast nearly $1\frac{1}{2}$ miles, and from the African between 9 and 10. The greatest length of the island is nearly $3\frac{1}{2}$ miles and its average width about $1\frac{1}{4}$. Its circumference, following the sinuosities of the coast line, would probably exceed thirty miles. Opposite to Perim, on the Arabian side, is Fisherman's or Pilot Rock, a small rocky island, the passage between it and the mainland being studded with a reef of peculiarly sharp rocks exposed at low water. The

---

[*] From an account of Perim by Lieutenant J. S. King, of the Bombay Staff Corps, in the *Selections from the Records of the Bombay Government*, No. XLIX, New Series, 1877.

Small Strait, which is the passage usually taken by steamers, lies between Pilot Rock and the S.E. end of Perim, and the *Broad Strait* between the western end of Perim and Ras Sejan on the African coast. In some parts of the Broad Strait there are no soundings except with the deep sea-lead, and in 1876 one end of the broken Red Sea Cable was picked up there in 1000 fathoms.

The harbour (which has many natural advantages) faces the south-west, and is 1½ miles in length with an entrance 860 yards wide. It is almost surrounded with long ranges of gradually-sloping hills, averaging about 90 feet in height, and so affords safe anchorage for ships in all winds. Behind a headland in the harbour upon which the old fort stands, is the Inner Harbour or Fisherman's Bay. The currents at the ebb and flow of the tides, both in the harbour and straits, are very rapid, and a curious fact connected with them is that the flood tide runs out from the Red Sea and the ebb tide sets in. Small steamers passing through the Narrow Strait with both wind and tide against them have often great difficulty in making any headway at all.

At the south-west of the harbour is a long, low, and narrow tongue of land like a natural pier or breakwater called "The Spit." Towards its extremity it widens a little and rises gradually, terminating abruptly in a rocky bluff about 30 or 40 feet high. On its inner side is a belt of hard conglomerate coral from 20 to 30 feet broad, covered at low tide by only two or three feet of water. If this reef, which is nearly straight on its outer edge, were built up with stone, an excellent pier could be made, alongside which even large ships might be moored to discharge or receive cargoes. This work would be particularly useful if Perim should ever be made a coaling station. To the east of the harbour is False Bay, which at high water might be a good harbour during the prevalence of the northerly wind, as it is enclosed on three sides by hills, but the whole bay is so choked with madrepore as to be unsafe even for small native craft.

Viewed seawards Perim presents the appearance of a long, slightly elevated, table-land, completely covered with dark coloured boulders. The fort and lighthouse stand on the summit of a range of hills 203 feet above the sea, and overlook the Narrow Strait. The lighthouse is enclosed within the walls of the fort at the north-west end, the summit is 241 feet above the sea and in clear weather the light is visible at a distance of 22 miles. The light has four branches, and there is a space of one minute between the flashes, each of which lasts ten seconds. At the end of the fort furthest from the lighthouse are the commanding officer's quarters, a substantial double-storied, flat-roofed house. The European officer in command is supposed to be relieved every two months, with the detachment, which consists of fifty men (including one native officer) of the Native Infantry Regiment stationed at Aden.

Overland postal communication with Aden is carried on by means of camel dawk twice a month. The postman, on the night of his arrival at Bab-el Mandeb, lights a fire, which is seen by the look-out man on the lighthouse. A boat is then sent across, unless the weather is unfavourable, in which case the "exile of Perim" may have to wait two or three days for his letters. A steam launch, fitted as a lifeboat, is much needed, both for the postal service and for succouring ships in distress. There is a signalling staff just outside the fort, by means of which the commanding officer can always communicate by signals with passing ships, but there is no telegraphic communication, though the Red Sea cable passes through the Broad Strait within two miles of the island.

Numerous attempts have been made at different times to excavate for fresh water on the island, but always without success. The drinking water is accordingly condensed, and an inferior quality (called *purchased water*), for bathing, &c., is brought over in *bugalas* from the Arabian and African coasts, that from the latter being the best. There is a commissariat contractor who is bound to keep a three months' supply of each article on the island. Arabs also frequently come across the Strait in canoes, with fresh provisions of all kinds for sale, the prices of which are very moderate. They also sometimes bring the leaves of a shrub called *kát (Catha edulis)*, a drug much used by the Arabs and Somalis as a pleasurable excitant, the leaves and tender shoots being said, when chewed, to produce hilarity of spirits and an agreeable state of wakefulness. Fish are very plentiful; the best kinds for eating being the *surmáhi*, *halwá*, *bui*, pomphlet, sardine, and a kind of red mullet. Whales and immense sun-fish are sometimes seen, even inside the harbour, and sharks and porpoises are very numerous. Turtles are occasionally caught on calm moonlight nights, when they come on shore to lay their eggs in the sand. At Perim as well as Aden, every year, at the change of the monsoon—generally in October or November—immense quantities of fish of all kinds are washed ashore dead. This plague lasts several days, during which every one has to turn out and help in burying the putrid fish. The natives believe that it is caused by the fish eating some poisonous spawn; but, according to Lieutenant King, a more likely cause is the prevalence at that time of electricity in the sea. Snakes, scorpions, and rats are common in the island: penguins, sea-eagles, hawks, kites, parrots, and many kinds of sea-birds are generally to be seen, and quail have been shot on Perim.

The surface soil on many of the level portions of the island, both high and low, being to a great extent saturated with salt, is not very productive; but there is abundance of good limestone soil on the slopes of the hills and in the water-courses. The large flocks of goats belonging to the Somali inhabitants live almost entirely on the leaves of plants and grass, which they find in their wanderings among the hills. A great deal of this grass is of a very coarse description, but Lieutenant King found by experiment that when planted in good soil, and watered regularly, it became much finer. The principal plants and shrubs are senna, statice or sea-lavender, salsola, datura, portulucca, wild mignonette, *bábhul* (gum-Arabic), and *pilu* (*Salvadora Persica*). The latter is supposed to be the mustard tree of Scripture, and is much used by the natives for making their *miswáks*, or tooth-cleaners. An innumerable number of beautiful and curious as well as useful shells are to be found at the neap tides seasons on the shores of the bays, especially in False Bay, and a classified list of the more common of them is given by Lieutenant King.

Among them may be mentioned the *Indacna gigans* which sometimes attains the diameter of 5 feet and a weight of 500 pounds, the flesh alone weighing thirty. The muscular power is said to be so great as to be able to cut through a thick rope on closing the shell. The Republic of Venice presented one of these shells to Francis I., who gave it to the Church of St. Sulpice in Paris, where it is still used as a basin for holy water. The natives of the Molucca Islands are fond of eating the fish, the flesh of one is a sufficient meal for twenty people, and the shells of the clam are occasionally used as feeding trough or baths for children.

As regards its geological features, Perim seems to be a connecting link in the volcanic chain which runs down both shores of the Red Sea, and to owe its origin to a volcanic upheaval, which probably took place about the middle of the Tertiary Epoch. It appears to have since undergone submersion and successive upheavals; and volcanic disturbances in the neighbourhood, which are related to have taken place —for example, in A.D. 1253 and in 1846—no doubt affected Perim also. The successive volcanic upheavals to which the island has been subjected, assisted by the formation of fresh coral reefs, account for the extensive plains on the north side, these being the old sea beds of various bays, which formerly intersected the coast line. The old coral beds are from 10 to 15 feet in thickness, and large masses, which have been undermined by the sea, have fallen in, and, in the course of ages, formed beautiful white sand.

Although the island is of volcanic origin, yet there are outcrops of schist, shale, and limestone, which have been tilted up by the upward pressure of the igneous matter. All the hilly portions of the island are covered with basaltic and trachytic boulders, of every size and shape, but mostly rounded and versicular, and of a black or dark reddish colour. Underneath these lies a layer of volcanic soil, from 2 to 6 feet in depth. The ordinary versicular trachytic boulders, besides being extremely hard and difficult to cut evenly, make bad building stone, on account of their disintegrating tendency, but excellent limestone may be found by digging to a depth of two or three feet on any of the small kunkur hillocks which occur all over the flat summits of the hills. Three different varieties of good building stone are also to be found at Azalea Bay. Lime for building purposes is to be had by burning the coral, or by dredging for lumps in the harbour at low water. There are three or four limekilns, but all firewood having to be imported from Aden or from the African coast, lime is very expensive.

Owing to the general conformation of the shores of the Red Sea, the winds, for the most part, blow in the direction of its axis, being for eight months from the north-west, and for the remainder of the year from the south-east. The north-east monsoon, on entering the Red Sea, is completely deflected, and rushes up the axis of the sea as a south-east wind. At the change of the monsoons the heat is very oppressive, but at other times the strong breeze tempers the heat pleasantly. On the whole, the climate of Perim is remarkably healthy. Roads are much wanted, owing to the quantity of loose boulders and sharp stones with which the island is covered.

The object of our original occupation of Perim in 1799 was to prevent the enemy coming down the Red Sea, but as there is little danger of this happening at the present day, so long as we can hold Egypt and the Suez Canal, an enemy would probably attempt to take Perim from the east, and if they succeeded would completely block up the Red Sea. To prevent this two or three batteries of heavy guns are necessary on the west and south sides, while the straits would be best defended by torpedoes and two turret ships with heavy guns stationed in the harbour and cruising off the south of the island at night to prevent a surprise. Colonel Sir Wm. Jervois, R.E., recommends the construction of a small circular casemated fort with ditches and a glacis, and with iron shields at the embrasures for ten M.L.R. guns, at the extremity of the Spit. The cost of this work, including armament, he estimates at 82,000*l.*

Lieutenant King remarks of this scheme that barracks would have to be built for the 150 men composing the garrison, either at some considerable distance from the fort or in some exposed position close to it. An enemy coming up from the south-east could avoid the fire from the fort, and *might* succeed in planting guns on the heights above False Bay, and so easily command the proposed fort. Lieutenant King suggests instead Murray Point, or the place where the old fort stands as better sites, and points out that with good roads light field pieces might be moved to any commanding position, so as to prevent a landing on the shore. The approaches to the island could only be defended by turret ship and torpedoes.

The earliest mention of Perim is made by Ptolemy, who calls it Perantonomasiam, or extending across to Asia, but the island does not appear to play any part in history till A.D. 575, when the Abyssinians, having conquered Yemen, M'Adi Kárib, son of Saif, the last of the old Himyarite race, obtained from Kasra-an-Noushirwan, the Persian King, a force of 3,600 men, consisting of malefactors in the prisons, and sailed in eight vessels for Aden and El Maiyun, or Perim, from which places they effectually drove out their foes, after which M'Adi Kárib was created Viceroy of Yemen. In 1513 the Portuguese fleet under Don Afonso de Albuquerque entered the Red Sea and touched at Perim on his way to Aden and India, and named it Vera Crux in memory of a very bright red cross which he had descried in the heavens a short time previously. Don Juan de Castro, a captain in the Portuguese fleet, and afterwards Governor-General of Portuguese India, in the journal of his voyage from Goa to the Straits of Bab-el Mandeb in 1540, gives a tolerably correct account of Perim. Sir Henry Middleton, commander of one of the expeditions sent out by the English East India Company, passed through the Narrow Strait on the 14th November 1610, on his way to Mocha, and describes Perim as "a low flat island." Two years later, Captain John Saris, of the 'Clove,' under the orders of Sir H. Middleton, passed through the Broad Strait on his way to Mocha. The mouth of the Red Sea was at one time much infested by pirates, who amassed considerable booty by plundering the native vessels engaged in the Indian trade. In 1695, under the leadership of Captain Evory, they established themselves on Perim, and commenced building regular fortifications and digging for water, but, being unsuccessful in this, they abandoned the design and removed to St. Mary's Island on the east side of Madagascar.

In 1799, during the war with the French in Egypt, Perim was occupied by a British force, in order to prevent the French coming down the Red Sea and attacking our Indian possessions. This force, called the Red Sea detachment, consisted in all of about 300 European and native troops, and was commanded by Lieutenant-Colonel J. Murray, R.E., who was appointed Political Commissioner for the Red Sea. He arrived in Perim Harbour on the 3rd May 1799, and on the same evening took formal possession of the island in the name of the East India Company. A few days afterwards a naval force, under the command of Commodore Blankett, arrived from Great Britain with orders to assist Colonel Murray in holding the entrance to the Red Sea. The detachment had not been long on the island before the want of water began to be felt, and though every effort was made to procure water on the island, it proved unsuccessful, and on the 8th September Colonel Murray withdrew the greater portion of his troops to Aden. Numerous traces of Murray's occupation still remain on the island, including a ruined circular tank, intended to hold 25,000 gallons.

During the year 1855 a good deal of correspondence passed between General Coghlan, then Political Resident at Aden, and the Government of Bombay relative to the erection of a lighthouse at Perim, and in the following year Sir Henry Leeke, Commander-in-Chief of the Indian Navy, strongly recommended that this step should be taken, and that Perim should be occupied by us for the purpose. In the course of his letter he pointed out that this island was the key to the Red Sea, and that in the event of a war it might form a place of resort for privateers. "Again (he continued), in the event of a ship canal being cut between Suez and Alexandria, the value of such an island to the interests of trade is very apparent and of the utmost importance to England and India." Sir Henry added a significant postcript to the end of his letter, stating that he had just heard that a French engineer* was about to survey Perim and the islands in the Red Sea. This intelligence induced the Government to pass a resolution in the Secret Department on the 10th November 1856, directing the immediate occupation of Perim. Lieutenant Greig, R.E., Assistant-Engineer at Aden, with a detachment of Sappers and Miners left Aden for Perim in the H.E.I.C schooner 'Máhi' on the night of the 13th January 1857, and on arriving there built a defensible barrack or block-house. He also made an accurate plan on the scale of 500 feet to an inch, but a fresh one, with contours 12½ feet apart is much needed. Lieutenant King, from whose description our article is borrowed, spent eleven months on the island and fully explored every part of it.

---

* This was M. Lambart, agent of the firm of Menon, Lambart, and Co., of Bombay and Mauritius. He had during the past twelve months visited and surveyed Perim and did not hesitate to state that he had recommended the French Government to occupy it.

A DESCRIPTION OF THE ISLAND OF FORMOSA.

With some Remarks on its Past History, its Present Condition, and its Future Prospects.

(*Continued from page* 266 *of our last number*).

The one common characteristic of all the villages (a characteristic from which, unfortunately, the cities are not free) is dirtiness. It is hard to say whether the inside or outside of the houses is worst. As in other parts of China, the night soil is collected in pits, public latrines being erected at various places. These, however, are never cleared out, the tubs for the fields being filled as required, and the whole neighbourhood of one of these pestilential holes is a mass of festering putrefaction. Tubs are also placed in the streets and courtyards, with very little regard to decency.

At most of the villages there are one or two inns. The sleeping rooms are generally 10 or 12 feet square, and contain two beds. The beds are of bamboo, and are fixtures. Fortunately, the only bedding is a mat. Sometimes there is a hole through the wall—more than half filled with wooden bars—which does duty as a window; but the rooms are invariably so dark that a lamp is required even during the day. The lamp consists of a small cup of oil, with the pith of a rush projecting a short distance over the edge. The lamp gives a great deal of smell, and enough light to smoke by.

The inhabitants have no idea of the advantage of fresh air. On one occasion, in company with Mr. Elles, I entered one of these rooms in Ung Kang Bey. The entrance was through a cooking and eating room, into a court partially roofed over, and filled with refuse and filth of the most disgusting description. The door of the bedroom opened into this court, and the window consisted of one tile replaced by a few pieces of oyster-shell. The room being oppressively close, I tried to explain to the proprietor that I would like some air, and suggested removing some tiles. After some time, an idea seemed to strike him, and, mounting on a stool, he pulled aside one tile that was made to slide. From his delighted air, and from the way in which he kept pointing at it, and ejaculating "Haw! haw!" I came to the conclusion that this was a unique contrivance, and was probably used for the first time. The size of the opening was 5 inches by 3.

The want of a good road ought to be severely felt, but I doubt if many of the inhabitants really think that anything better than the present road is required. The main road from north to south varies from 3 to 8 feet in width, where it is visible: in some places it is lost in a maze of paths. In the northern part of the island it is paved with round water-worn stones, driven in so as to form a causeway; and near Kagee it is paved with flat stones, about a couple of feet wide. In many places, however, it is merely a mud track, almost impassable in bad weather. Near Taiwan-fu, and also near Teukcham, bullock carts are used. As a rule, these can be used, not in the districts where the roads are good, but in the districts where the land is poor and there is little cultivation, and, consequently, the carts can leave the track in bad weather. There is no road on the island sufficiently good to sustain regular cart traffic at all seasons.

The country which has just been described is the flat and civilised portion of the island. The hilly and uncivilised portion is of quite a different character. The west coast of the island is so low that it can hardly be seen at a distance of 3 or 4 miles, and houses and trees near the coast are liable to be mistaken for junks at a very slight distance. The east coast, on the other hand, is generally mountainous, with deep water very close to the shore. A ridge of mountains runs up the centre of the island. Mount Morrison, the highest of the range, is said to be 12,850 feet, and Mount Sylvia 11,300 feet. Mount Morrison is not named after the well-known missionary and Chinese scholar, but after the captain of one of the early vessels trading to Taiwan-fu.

All the land east of the mountains is supposed to be hilly, and inhabited by savages.

About 20 miles to the east of Chang-hwa there is a valley called Posia. This valley contains thirty-two villages, inhabited by semi-civilised savages. No foreigner resides there, but there is a branch of the Presbyterian mission, and the place is regularly visited by the foreign missionaries. Besides them, a few foreigners have penetrated there from time to time. Until lately the road to Posia was very bad, but it has recently been much improved. From Ta-niau, a village 6 miles north of Kagee, a tolerable path leads eastward to Chip-chip. A road from this point to Posia was commenced by the Chinese in 1876, and completed early in 1877. This road runs along the side of the hills, and is made by cutting a narrow path out of the slope, and using the material to increase the width by embankment. Before the road was finished, the southern portion was much injured by rains, the embankment in many places being entirely washed away. The road passes near a lake, which is about 3000 feet above sea level. The borders of the lake are inhabited by a small tribe called Shwui-hwans, or water savages. The hills round Posia are carefully cultivated in terraces. Millet is largely grown, also a fine quality of hemp used for making grass cloth.

For some time the Chinese have had military stationed on the borders of the savage country, trying to open up communication with the east coast. Sau-o Bay, on the east coast, and all to the north of it, have been in Chinese hands for many years. South of it, there are two Chinese settlements, called Sin-cheng and Khe-lai. The most northerly has been in existence twenty years, but has never numbered more than a hundred Chinese. In Khe-lai, on the other hand, there are about 700 Chinese and about 1000 semi-civilised savages.

In 1875, the military constructed a road running along the coast for about 60 miles south from Sau-o Bay, and passing through these settlements. Early in 1877 it was reported that the military from Chip-chip had constructed a road to meet them, and had effected a junction.

The people who inhabit the two parts of the island differ as much in their characteristics as do the two portions of country. The inhabitants of all the level country are Chinese. They have come from all parts of China, but principally from the Fokien province. The colloquial language closely resembles, or, indeed, is almost identical with that of Amoy. The separate clans of Chinese were at one time almost as hostile to each other as to the aborigines, but they are now on much better terms, and to the foreigner the Chinese appear to be divided into two classes only, viz., the ordinary Chinese and the Hakkas. The Hakkas emigrated from the province of Kwang-tung some years ago. A great many are to be found inhabiting the villages in the south of the island. Ten or fifteen years ago these people lived entirely by plunder, and at the time the ports were first opened it was as much as a foreigner's life was worth to pass a night in one of their villages. They are a hardy race, and if they do not settle down to quiet industrial occupations so readily as the other Chinese, they have more daring, and are much more enterprising. In many parts of the island they are to be found acting as go-betweens with the savages. In going north by the main road from Taiwan-fu, they are first met with about Tong-siau, some 12 miles north of Tyka. From this point they are met with at intervals right up to the north of the island. There is a large settlement of them at Tokoham, where they are engaged in the preparation of camphor. There is a great contrast between the Hakka women and their Chinese sisters. The Hakkas never contract the feet, and consequently can walk well. As a result they have sometimes to do hard work in the way of carrying heavy bundles which no other Chinese woman could lift, or at least walk with; but in spite of this they have always a cheerful expression. They are well made, and in many cases handsome. They wear loose trousers, and walk with bare feet. The Chinese women are not unkindly treated, and the compression of the feet does not seem to have any evil effect, but it tends to make them helpless and unable to take proper exercise, and consequently they have often a sickly appearance.

In culture and general intelligence, the Chinese people of Formosa seem to be on a par with those on the mainland. The fact that wages are 20 per cent. higher than in Amoy is a proof that there is no lack of money in the island, though the fact of opium representing two-thirds of the value of all their foreign imports show that they do not make the best possible use of their wealth.

In speaking of distances they use the words *li* and *pau*, the latter being roughly about 10 *li*. As in other parts of China where foreigners have settled, a *li* is generally understood to mean one-third of an English mile. I believe, however, it corresponds better to such an expression as "a five minutes' walk," and did not originally represent a certain length. Mr. Baber says that in Szechuen he found places where the distance from A to B was 20 *li*, but from B to A 40 *li*. On questioning some people he was told that as it was up hill in one direction it would not be fair to the coolies if the length were stated the same in both directions. He suggested that the coolies sometimes had to work by night or in bad weather, but was met by the answer, "O! that is arranged for in the price." The best definition I can give of a *li* is the distance a coolie will walk with a burden in six minutes. A *pau* appears to mean the distance the chair coolies carry without setting down the chair. It is about fifty minutes or an hour's walk. Europeans are, however, impressing on the people the necessity of having clear measures of distance.

The laxity which prevails in civilised countries regarding weights has had its effect in inducing foreigners to submit quietly to the Chinese practices in this particular. A *picul* of camphor is expected to weigh far more than 100 *catties*. Sometimes as many as 150 are demanded. This is supposed to be an allowance for the loss in pressing or on the voyage. If asked how difference of quality was allowed for, the merchant would no doubt complacently answer, "O! that is arranged for in the price." The standard *picul*, by which every thing should be weighed, consists of 100 *catties* of $1\frac{1}{3}$ lb. avoirdupois, or $133\frac{1}{3}$ lbs.

In the matter of sawing wood they follow the plan of sawing on a horizontal plane; at least, I saw this system followed at Taiwan-fu, and I did not notice any other system in use in any other part of the island. This matter is worthy of notice. All over China the usual saw is a framed saw. The teeth are formed, not, as in our saws, to cut all in one direction, but one half of the teeth cut in one direction and the other half in the other direction, the change being made in the middle. The half of the saw farthest from the sawyer cuts when he is pushing, and the half nearest when he is pulling. In different parts of China the saw is used in different ways. In Shanghai, when a log has to be sawn, one end is raised from the ground and a trestle is placed under it near the middle, the lower end of the log being sometimes weighted. The sawing is commenced at the raised end, the saw being used as in the ordinary English saw pit, with this exception, that instead of being placed in the centre of a frame it is placed at one side, like the small saws used at home by cabinet-makers. When the saw draught has reached the middle of the log, the other end is raised, and a draught is carried to meet the first. I have had logs nearly 70 feet long sawn in this way with a saw not more than 3 inches wide. The work is, as one might suppose, indifferently done, the saw draught being always more or less twisted.

In Chefoo the same description of saw is used, but the log is laid on two trestles, and the saw draught is in a *horizontal* plane, the men standing or squatting one on each side. The log, when small, has to be fastened by ropes or by heavy weights laid on it.

In Tientsin, a large quantity of timber is imported in round logs 10 or 12 feet long and 4 feet or more in diameter. These logs are set up on end, the men mount on stages and saw in a vertical plane from top to bottom. When the log is too small or too light to stand in this way it is fastened up, sometimes not without difficulty. This method is capable of giving fair results, and is used for small pieces of wood in the shops in Shanghai, Canton, and other places. The sawing of large logs by this method is, as far as my observation has gone, confined to Tientsin. In Pekin I have seen the Chefoo method used, and, as above remarked, I have seen it in Formosa. It has one peculiarity which may recommend it to a republican mind—both men are equal, there is no "top sawyer."

Opium-smoking prevails to an extraordinary extent in Formosa; but, as far as one could judge from a short visit, there is not a great amount of smoking to excess. In travelling through the country, my chair coolies always smoked opium at night, and continued smoking after I had gone to bed; yet they were always ready to start before six o'clock in the morning, and seemed fresh. Any such coolie will carry 20 miles a day for ten consecutive days. Smoking in this way costs from 10 to 15 cents per day, and, when a man's wages are only 20 cents a day, opium-smoking soon means ruin; but the chair coolies get at least 75 cents when employed all day carrying, and, therefore, can afford it.

Of the savage inhabitants very little is known. Shipwrecked sailors who have lived among them have given some account of their life in captivity, but this is the only available source of information. Of the semi-civilised savages, however, we have accounts from missionaries and others who have visited them. These semi-civilised tribes go by the name of Pepohwans in the south of the island, Sekhwans in the centre, and Paktowhwans in the north; but these distinctions are seldom adhered to, and all over Formosa they are known by the name of Pepohwans. The Chinese appoint a head man for each village or district inhabited by these people, and he settles disputes according to his judgment; but there appears to be no law. Of late years the savages have been tolerably peaceable, and have carried on a considerable bartering trade with the Chinese; but, quite recently, an edict has been issued forbidding the sale to the savages of guns, powder, or lead. The sale is still going on surreptitiously; but, if it is entirely stopped, there is likely to be some trouble.

The savage women do some handsome embroidery. They are very fond of pieces of coloured cloth, which they pull to pieces, using the threads for this work. They also unravel coloured cloth—by preference, red, green, and orange—and weave or plait the threads into tri-coloured bands for turbans.

Formosa is the seat of two Presbyterian Missions, one connected with the English Presbyterian Church, and the other with the Canadian Church. The English Mission has its head-quarters at Taiwan-fu. The Rev. Dr. Dickson and the Rev. W. Campbell are stationed there. Both of these gentlemen have travelled over much of the island where no other foreigners have penetrated. Mr. Campbell was the first, or one of the first, to enter Posia. Dr. Dickson is a medical missionary, and he has established hospitals at Takao and Taiwan-fu, which are much appreciated by the Chinese. He is often asked by soldiers to prescribe for them, and has offered to attend a military hospital if the authorities will build one, but nothing has yet been done. The Canadian Mission is under the charge of Dr. Mackay. This gentleman lives near Banka, in the north of the island, and is on extremely good terms with all the Chinese authorities there.

The usual mode of travelling in Formosa is by chair. Ponies may be used for riding short distances, but the numerous rivers, too deep to ford and too rapid to swim, render them useless for long journeys, many of the frail rafts or boats which are not very unsafe with one or two chairs being quite unsuited for ponies. The Formosan chair is very light, and may be comfortable for a Chinaman. It is 40 inches long, 48 inches high in the centre, and 40 inches at the sides, and 21 inches wide inside, with a seat about 10 inches high. These dimensions are enough to show that there is not much room for an ordinary-sized Englishman to move about; still, with the aid of a thick Chinese blanket, the chair can be made tolerably comfortable. The method of carrrying is simply diabolical. Four men carry, two being placed at the ends of the poles, and two close to the chair, one in front and one behind, the two latter supporting the chair by means of cross pieces or yokes passing over the shoulders and attached to the poles by ropes. These ropes are so adjusted that when the men stand still and the chair is loaded, the poles are bent about 3 inches. In carrying, the easy swing of the ordinary chair is lost, for just as the Formosan chair is coming down gently, it is brought up sharp by the men close to it. The motion is exactly the same as is used for jigging crushed metallic ores.

The chairs in Canton are carried in somewhat the same manner, but the poles are better, and the motion is not nearly so disagreeable. The proper method of carrying by four men, with balance bars, as used in Hongkong and in many parts of China, is unknown in Formosa, except in the case of the chairs of a few customs officials. Chinese are sometimes carried by two men, but no foreigner can induce the natives to carry him in that way, even if he offers to provide relays. For short distances three men are employed. This is somewhat worse than four. It is true that, after some practice, one gets accustomed to the motion, and can read and, I believe, sleep; but at first it is very trying.

Foreigners, as a rule, walk a great deal—say, half the day or more—when travelling; but it is necessary, or, at all events, convenient, to have a chair for crossing the shallow rivers. Twenty miles is a fair day's journey, if the men carry all day; but 25, or, at a push, 30 miles may be done, if the traveller walks much. It is only in rare cases, however, that a foreign traveller wishes to go so fast.

In travelling through the civilised part of the island, it is a good thing to take a proper supply of provisions. Carrying coolies can easily be obtained, and no advantage is to be derived from going badly provided, except the advantage of being more than usually uncomfortable. Coolies can be engaged at a cost to the traveller of about $1 for each per day. Having decided how many coolies will be required, the best plan is to make a bargain with a head man for the whole journey. He will then go through the whole way, changing coolies, if necessary, at the villages on the road; but this does not affect the contract. Fowls, eggs, and sometimes fish can be obtained on the road; but bread, tinned meat, cheese, spirits, &c., must be carried. Two coolies can easily carry provisions for two travellers for a week or ten days.

It is true that a person who has been long resident in the country, and who knows the language, may see more if he travels alone, and may learn something of the ordinary home life of the Chinese, from which the traveller with his string of coolies would be entirely shut out, and he will, moreover, effect a considerable saving in expense; but the ordinary foreign traveller would, probably, see less if unattended than if he had the usual retinue, and the saving of expense would be small compared with the total cost of a journey to the island. A boy acquainted with the language should accompany the party, and should have a chair. He will then be able to cook and serve up meals. It must, of course, be understood that these remarks refer only to the civilised portion of the island. When the traveller makes up his mind to enter the borders of the savage country, he must cut down his baggage to the smallest possible dimensions, and, if he carries provisions, should only carry a small supply to guard against emergencies, and not for general use. And here it may be well to speak of carrying a revolver or other weapon. In a country where a traveller is likely to be attacked by brigands or robbers, a stout heart and a good revolver may carry him safely through many difficulties; and in the savage part of Formosa, as in all savage countries, a certain amount of respect will be given to any one who goes about evidently prepared to fight for his rights. In the civilised part of Formosa, however, or in any part of China where there is a fair amount of civilisation, a revolver is worse than useless. If any serious difficulty arises, it will be with the population in general, or with large numbers of them, and against such odds fire-arms must be not only useless, but dangerous. In the first place, if used rashly, it may cause a petty squabble to assume serious proportions, in which case lives may be lost, that of the traveller included. In the second place, people are more ready to resort to violent measures with a man who carries a weapon that at any moment may be used to wound or kill, than with a man who is wholly unarmed. I have carried a revolver for weeks on the borders of Greece, sleeping with it under my pillow at night; and I have travelled without one in many places, including Formosa (though I took one to the island), and the more I see and hear of travelling in thickly-populated countries, the more I think arms of any sort unnecessary encumbrances.

I am by no means of those who say that in all cases of a squabble between foreigners and Chinese the former are to blame; still a foreigner may often take offence where none is intended, and so unwittingly give rise to disputes. The extreme curiosity of the Chinese is very trying. They crowd round one, and take special notice of every movement. One cannot blow one's nose, or make an entry in one's note-book, without giving a subject of conversation to scores of spectators. At meals they will crowd round one out of doors until one can hardly breathe, and indoors they will crowd into the room, or, if it be possible to keep them out of that, they will apply their eyes to every crack and crevice, of which there are sure to be plenty. No one who has not experienced the annoyance of this knows how trying it is. The first time the novelty of the scene may somewhat amuse, and possibly, after years of experience, one may become hardened. On this latter point, I can only say eighteen months has not been long enough to harden me. I know by experience that it is possible to control one's temper, so as to avoid striking; but if any traveller were to strike a native under such circumstances, I should be far from saying there were no extenuating circumstances; and yet, if trouble ensued, it would be necessary to treat the case as one in which the foreigner was in fault, for a hundred chances to one the native had not the slightest idea he was even being rude.

James Morrison.

(To be continued.)

THE SWEDISH ARCTIC EXPEDITION OF 1878.

[WE have received the following particulars concerning the intended Swedish Arctic Expedition of 1878, from Captain Palander, the gallant officer who commanded the 'Polhem,' and wintered on the north coast of Spitzbergen in 1872-73.]

The object of the Expedition is to make progress from Novaya Zemlya eastward, trying to force a passage along the coast of Siberia, and returning home through Behring Strait, and by the Suez Canal, thus sailing round Asia and Europe.

The cost of the Expedition will be defrayed partly (provisions and wages) by the Swedish Government, and partly by the King of Sweden; Oscar Dickson, Esq., of Gothenburg; and a Russian gentleman, Mr. Siberiakoff.

The whaling steamer 'Vega' has been bought for the Expedition, and no other vessel will take part in it. The 'Vega' is a very strong ship, built of oak, and doubled outside with 4 inches greenheart, is barque-rigged, has a 60 H.P. engine, coals, sparing machine, and can load, inclusive of bunkers, about 500 tons. She will carry as much coal as to steam about 8000 nautical miles. The vessel will be thoroughly overhauled before sailing as regards the hull, engine, rigging, and sails, at one of H.M. Navy stations.

The 'Vega' will be provided with two to three years' provisions, inclusive of preserved food, of which there will be abundance, especially of the kinds that are, or are supposed to be, anti-scorbutic. A small steam launch is being built, which is to be used for soundings ahead of the steamer, while proceeding along the Siberian coast, where the water is supposed to be in many instances very shallow. The launch will also be used for river excursions.

The members of the Expedition will be—Professor Nordenskiöld, as chief; Louis Palander, as captain of the 'Vega'; two mates, a surgeon, and three or four scientific men. As surgeon a person will be selected who, besides his professional qualifications, will be able to co-operate with the scientific men in their zoological, botanical, and other researches. The whole complement of the Expedition will be, in all, about thirty persons. The crew will consist exclusively of naval seamen, with the exception of a few whalers, the former to be chosen from those who have volunteered to go. No one will be allowed to join who does not enjoy good health. It is not considered desirable to take seamen who have already passed winters in the Arctic seas, because such men, in my opinion, are more liable to catch scurvy than others.

The Expedition will sail from Gothenburg about the 1st July 1878 for a Norwegian port, Tromsö or Hammarfest, where the bunkers will be refilled. From thence we shall shape our course for Matotschin Shar, in Novaya Zemlya, where we shall watch for a favourable opportunity to cross the Kara Sea. We shall then call at Dickson Harbour, situated at the mouth of Yenisei River, which place we expect to reach in the beginning of August. The Expedition will then continue its progress to the north-east with as little delay as possible, in the channel which the water from the rivers Ob and Yenisei will doubtless keep open along the coast, at least as far as Cape Chelyuskin. If possible, we shall in the meantime make a tack to the north, with the object of seeing if there is any land between the northern part of Novaya Zemlya and Siberia.

At Cape Chelyuskin the Expedition will arrive at the only place on the projected route where no craft has navigated before, and this, on the whole, is considered to be the most difficult point to pass along the whole North-East Passage.

As Prontschischeff, in 1736, got within a few miles of this cape, in very primitive small river crafts, it is anticipated that our ship, fitted out with all the latest improvements, will be able to pass, and we even hope that there is a probability of our reaching Behring Sound by the end of September.

It is desirable, if time and ice permit, to run to the north, with the object of ascertaining whether any land can be discovered between Cape Chelyuskin and New Siberia, as well as between the latter islands and Wrangel Land.

From Behring Sound the expedition will first proceed, after as little delay as circumstances will permit, to some Asiatic port, whence news can be sent home, and will afterwards continue the voyage round Asia to Suez.

Should the Expedition be hindered from forcing its way farther east than Cape Chelyuskin, it must depend upon circumstances, which are difficult to foresee, whether it will return direct to Europe—in which case the ship, as fitted out and manned, can be immediately used for some other object—or whether it should winter at a suitable port in Tajnums Pjäsinas, or in some bay at the mouth of the Yenisei.

On the other hand, if the sea east of Cape Chelyuskin is found to be blocked by ice, then a suitable port must be chosen for wintering on the north coast of Siberia, whence during the following summer, opportunities may offer for valuable investigations in the Polar Sea north of Siberia, and during the latter part of the summer some favourable opportunity will probably occur, when south winds have driven the ice from the coast, of reaching Behring Sound.

In all probability, if it is necessary to winter on the Siberian coast, opportunities will offer for sending letters home.

As a matter of course, this Expedition, like all other enterprises of the kind, is exposed to many accidents difficult to foresee, and the consequences of which it is impossible to calculate.

It is quite within the range of possibility that the Expedition, in its infancy, may meet with a check so serious as to prevent us from carrying out the proposed programme with the necessary vigour. But if nothing of the sort should happen, and the Expedition is spared from sickness, shipwreck, and other unforeseen calamities, it ought, in accordance with the above plans, and independent of the difficulties of ice navigation in the almost unknown seas which it is intended to search, to return with valuable results. These results will not only be of great importance as a fresh contribution to our knowledge of the globe, of its geography, geological history; of its animal and vegetable life; and of practical use in extending navigation in the Arctic seas; but they will also be of practical value, as giving a correct explanation of several of the phenomena of nature in our own country.

LOUIS PALANDER.

Reviews.

——:o:——

THE TRANSVAAL.[*]

The publication of Mr. Silver's handbook supplies us with much well-arranged information respecting the late Transvaal Republic, while Mr. Campbell-Johnston's able pamphlet enables us to perceive that there are two sides to the question of annexation.

The Transvaal is the most northern of all the European settlements in South Africa, its southern limit being 700 miles from Cape Town. It extends from the Vaal, a tributary of the Orange River, across the tropic of Capricorn, to the banks of the Limpopo, a distance of 400 miles, and lies on the eastern side of the continent, with the Kalahari Desert on its western border. The Transvaal has an area of about 120,000 square miles, and is a tableland, upwards of 3000 feet above the sea, with the Drakenberg on its eastern border, throwing up peaks to a height of 7500 feet. From east to west the plateau is traversed by three mountain ridges, the sources of numerous rivers. Dr. Mann describes the plateau as a shallow basin, surrounded by an elevated rim, which rises to heights varying from 5000 to 10,000 feet above the sea. This rim conforms to the general line of the sea coast, at a distance of 100 to 300 miles from it, but towards the equator it turns inland, and forms the southern water-parting of the Zambesi. The rim then turns obliquely southwards, between the 30th and 25th meridians, and, crossing the channel of the Orange River, finally strikes the coast range of the Stormberg, and so surrounds an oval, saucer-like space, nearly 1000 miles long by 400. The interior of the basin is drained by the Orange and its tributary, the Vaal, and by the Limpopo. These rivers have to break through the rim of the basin in order to convey their waters to the ocean, the one on the western and the other on the eastern side.

The Transvaal is divided into three districts, the *Hooge Veld* (High Country), the *Banken Veld* (Terrace Country), and the *Bush Veld* (Bush Country). The High Country begins at the Vaal, and extends northwards, over a third of the whole land, a magnificent upland, having an elevation of from 4000 to 7000 feet, generally well watered, with a healthy climate. It includes the Lydenburg district, specially adapted for the growth of wheat. The Terrace Country lies along the mountain slopes of the Drakenberg, and consists of broken hills and deep gorges, well watered and wooded. The Bush Country is to the north and north-east, and extends over more than half the Transvaal, filling the area formed by the sweep of the Limpopo.

The Drakenberg Range begins in Cape Colony, and, skirting Natal, traverses the eastern side of the Transvaal from south to north, its length within the province being 400, and its width from 40 to 80 miles. The loftiest measured peak, called Mauchberg after the German traveller, is 7177 feet above the sea. The Libomba Mountains form part of the eastern boundary of the Transvaal, towards the Limpopo, intervening between the Drakenberg and the sea. The Zoutpansberg and Blauberg traverse the northern districts near the Limpopo, the highest point rising to 4000 feet.

The story of the occupation of Transvaal by the Dutch colonists of the Cape has not yet been worthily told. They were driven from their homes by English misgovernment and oppression. In 1796 we seized Cape Colony, and found a thriving and industrious body of Dutch farmers settled in the interior. The first oppressive act was the appointment of a "Commission of Circuit," to inquire into false accusations that the settlers had murdered some of the natives. Nearly every respectable family had these charges brought against one or more of its members. Not a single case was proved, but the settlers were subjected to excessive costs, and a bitter feeling of hostility was engendered. In 1815 another "Commission of Circuit" was appointed: there was a rising, followed by cruel executions at a place called "Slachter's Nek," which were never forgotten. The Government had, in 1801, issued paper rix dollars worth 4s. In 1825 the Colonial Office ordered British silver money to be legal tender in exchange for Cape paper rix dollars at 1s. 6d. This amounted to a confiscation of more than half the property of the people. From 1817 to 1824 the savage Kaffirs were allowed to devastate the homes of the frontier farmers, plunder their property, and burn their houses. The Government would give neither succour nor protection. At last a war broke out in 1834, when 450 houses were burnt down, 100,000 head of cattle and 150,000 sheep stolen, and many settlers massacred. Then Sir Benjamin Durban was at the head of affairs, "the best Governor the Cape ever had." He conducted the Kaffir war in person with great vigour, and Sir Harry Smith swept Kaffraria, and drove the savages across the Kei. But the vigorous and sagacious policy of Sir Benjamin Durban was reversed by Lord Glenelg, who sided with the savage Kaffirs in his despatch dated December 28th, 1834, and brought them back again to the frontier. The Boers had submitted patiently to false accusations, confiscation, and the absence of protection from robbery. But now they saw plainly that their English rulers intended to keep their lives and properties in permanent danger, and to withhold all protection. The foreign yoke had become too heavy for them to bear.

The Dutch settlers resolved to leave the homes of their fathers and wander northwards into the wilderness in search of freedom. They did not rebel, they simply left the country, submitting to poverty, and facing unknown hardships and dangers rather than remain under the oppressive rule of their conquerors. They took with them what they could carry in their wagons, gathered together old and young, women and children, and crossed the Orange River in 1836.

About 8,000 souls joined in the pilgrimage. Neighbours went together, electing for their leader the best man they knew. On reaching the Vaal River they encountered the fierce Matabeli savages under their chief Moselekatze, who suddenly attacked the advanced parties, killed thirty and carried off some of the children. The Boers were taken by surprise.

---

[*] *S. W. Silver and Co.'s Handbook to the Transvaal: British South Africa: Its Natural Features, Industries, Population, and Gold Fields* (1877), pp. 125.

South Africa: Its Difficulties and Present State, suggested by a Recent Visit to that Country. By A. R. Campbell-Johnston, F.R.S. (1877), pp. 68.

South Africa: Past and Present. By John Noble.

But in October 1836, when again attacked, they were prepared. Turning their wagons into a fortification, with their wives and little ones within, they repulsed the Matabeli, their long elephant guns proving more deadly than the assegais of the savages. But all their live stock was carried off, and it became evident that safety lay in taking the initiative. Accordingly it was resolved to form a body of a hundred mounted marksmen, trained to ride up swiftly to the fore, dismount, deliver fire, and gallop back to a safe distance for reloading. These picked men were to advance upon the enemy in his own territory and give him battle; and they were accompanied by a contingent of friendly natives. In January 1837, Maritz and Potgieter led this little force to attack the stronghold of a Zulu chief. The savages fled, leaving to the victors a multitude of cattle. Then the main bodies advanced, forming themselves into law-abiding little communities, and establishing relations with friendly natives.

At length they came to a pass in the Drakenberg mountains which led them down to the rich country of Natal, where they resolved to settle. Negotiations were entered into with a chief named Dingaan, who claimed the territory, and Peter Retief, one of the leaders of the Boers, with a considerable following, went to his capital to arrange a purchase. When all was settled, the treacherous savage massacred the whole of his guests. He then suddenly attacked the main body of the Boers, with their wives and children, during the night. There was a horrible massacre, and the site of the disaster is called "Weenen"—weeping—to this day.

Then three Dutch leaders, named Uys, Maritz, and Potgieter, mustered 800 men, and marched against Dingaan, but were defeated with much loss. In the retreat, Uys and his son, a lad of about fourteen, with a few others, kept together. The father was mortally wounded, and, feeling death approaching, he asked to be laid on the ground. His companions at last left him, but not before they saw that to remain longer on the spot would be certain death. After galloping a short distance, the younger Uys, on looking back, saw the enemy closing in numbers upon his dying father. This was too much for the feelings of the lad; he turned round his horse, and alone rushing upon the enemy, shot three Zulus, and was killed. The apologists of the annexation policy ask us to believe that the countrymen of young Uys are cowards!

Surrounded by these dangers, the heroic emigrants never lost heart. The women cheered on their husbands and brothers to endure, and to obtain success by deserving it. A famous man of their class, a farmer named Andries Pretorius, now became their leader. As before, they advanced with scouts in front, and every night the wagons were placed together so as to form a square. Pretorius led 600 picked men, and they made a vow to the Most High that wherever it pleased Him to grant a victory, there they would raise a house to His honour. The victory was theirs; and the Dutch church of Pietermaritzburg is the fulfilment of the vow. Dingaan was at last utterly defeated. The Zulus delivered assault after assault against the wall of wagons. Their army was 10,000 strong, and at last the ammunition of the Boers was exhausted. Then the gates of the camp were thrown open, and the 600 gallant Dutchmen rode furiously in amongst the 10,000 assailants. The victory was completed, and another crowning triumph followed in January 1840.

Justice ought to have prevented the English from further molesting these long-suffering and heroic wanderers. But it was not so. The Governor at the Cape, Sir George Napier, declared their occupation of Natal to be "unwarrantable," and troops were sent against them. But there was vacillation in the misdoing, and the troops were withdrawn. Soon afterwards another force was sent against them, and at length their patience was exhausted, and they determined to resist. Reinforcements arrived in H.M.S. 'Southampton,' and the Boers retreated to Pietermaritzburg, and eventually submitted. Natal was proclaimed to be British territory in 1843, and made a separate colony in 1856. This persecution caused another exodus. Once more the Boers struck their tents, placed wives and children in the wagons, with all their possessions, turned their backs on Natal, and headed for the wilderness. Crossing the Drakenberg, some settled in what is now the Free State, while others spread over Transvaal. Potgieter and his followers marked out a township, now called Potchefstroom. The land from the Vaal to the Limpopo was in possession of no dangerous tribes, and was free for them to settle in. A Government was formed, the laws of the old Dutch colony at the Cape were revived, and large areas were selected for farms.

Still, British attempts at interference followed them. Sir George Napier issued a proclamation, declaring that the emigrant farmers were not released from allegiance. In 1848 the Boers south of the Vaal were attacked by English troops, under Sir Henry Smith, and defeated at the battle of Boomplaats. Their leader Pretorius fled to Transvaal, under sentence of outlawry, but he was pardoned by proclamation in 1851. At length, on January 17th, 1852, British Commissioners signed a Convention (called the Sand River Convention), by which the independence of the Transvaal Republic was acknowledged. The British Government solemnly acknowledged the right of the farmers beyond the Vaal River to manage their own affairs, and to govern themselves according to their own laws, without any interference on the part of the British; and the British Government (by Article 3) disclaimed all alliances whatsoever and with whomsoever of the coloured nations north of the River Vaal.

After nearly twenty years of marching and fighting, privations and persecutions, the Boers had found a new country, and their right was acknowledged to govern themselves. If the British respected their own plighted word, the future independence of the long-suffering fugitives was secured. The Transvaal was officially styled the "South African Republic" in February 1858. Pretorious died in 1853, and his son became the foremost leader of the Transvaal settlers. In 1871, the younger Pretorius resigned, and Mr. Burgers, a Dutch colonist of note, born at the Cape, and educated in Holland, became President of the Transvaal Republic. He was an energetic and enlightened ruler, and was supported by the *Volksraad*, or Assembly. He made a treaty with Portugal, to secure access to the sea at Delagoa Bay, and obtained a promise of financial aid from Holland. But the English officials maintained a policy of unfriendliness and obstruction, as is shown in the letter from Mr. G. P. Moodie, a member of the Transvaal Volksraad, in our number for December 1873 (p. 387). The Republic had to fight its way through wars, through debt, and all the difficulties incident to the establishment of a government with the crude materials at their command, without a helping hand being offered to it. When any irregularity in the management of the natives has occurred, the people of the Transvaal have been met by threats of arming the natives for self-defence. When the diamond fields were discovered within Transvaal territory, the district was taken from the Republic. Transvaal was refused a participation in the customs revenues of Natal, although its exports contributed largely to them. No opportunity was missed of showing unfriendly feeling to the struggling Republic.

Meanwhile, progress was made, and a settled government was established. The two northern districts are Zoutpansberg and Waterburg. The midland districts are Lydenburg and the gold fields, Middelburg, Pretoria, Rustenburg, and Marico; and the southern, Utrecht, Wakkerstroom, Heidelberg, Potchefstroom, and Bloemhoff. Utrecht is the district nearest to Natal, and its frontier is not more than a hundred miles from Durban. The most central district is Pretoria, which was the seat of Government. The white population of Transvaal is about 40,000, of whom 8,000 are men; and there are 250,000 natives. The farmers have large flocks and herds, and the wheat of Transvaal is the finest in South Africa; while the mineral wealth of the country is remarkable. The Lydenburg gold fields in the Drakenberg Range were discovered in 1873, about 150 miles north-west from Delagoa Bay.

The Government of the Republic was composed of a President and Volksraad, consisting of forty-two elected members, three for each district, one for each of the four chief towns—Pretoria, Potchefstroom, Lydenburg, and Rustenburg—and two for the gold fields. The President was elected for five years, and the Secretary was chosen by the Volksraad. A Supreme Court, presided over by a Chief Justice, administered Roman-Dutch law, and each district had its local magistrate's court. The revenue in 1874 was 71,846*l.*

The arrangement of President Burgers with the Portuguese Government for access to a seaport in Delagoa Bay, led to a claim from the British Government. It was a matter of great importance to the Transvaal people. For the distance of Potschefstroom, the largest town, was 419 miles to Durban, in Natal, and only 250 to Delagoa Bay. An account of the boundary dispute between the British and Portuguese, respecting Delagoa Bay, will be found at page 347 of our number for February 1873, with a map. The dispute was submitted for arbitration to the French Government, and Marshal MacMahon, of course, decided against the British claim.

This matter having been settled, President Burgers soon afterwards found himself obliged to resist the preposterous territorial claims of a Kaffir chief named Sicocoeni. He met with several defeats, but afterwards successes were obtained, and in time the disorders would have been suppressed.

But the difficulties of the Transvaal Government were taken advantage of by the Colonial Office, and Sir Theophilus Shepstone was, in 1876, sent out as a Commissioner to annex the country, in defiance of the Convention signed in 1852.

Sir Theophilus Shepstone, who was created a K.C.M.G. last year, is a colonial official who had been Secretary for Native Affairs at Natal since 1843. His policy is not considered by competent judges to have been beneficial to that colony. It has induced large numbers of Kaffirs to flock across the frontier, until they number 400,000, or 20 blacks to every white. Natal has been turned into a mere Kaffir settlement. Their abominable customs are fostered and encouraged. Their great object is to have as many wives as possible, for work, and daughters for sale. The women sales and purchases were permitted, and actually there was a fee of 5*l.* on every Kaffir marriage (*alias* daughter sale), yielding 15,000*l.* a year. It was not abolished until 1875. The legal price of a wife is now fixed at ten head of cattle. The manager of Kaffir affairs in Natal, was chosen to carry out the annexation policy in the Transvaal.

On the 12th of April 1877, Sir T. Shepstone issued a proclamation declaring that the territory of the Transvaal Republic was annexed to the British dominions, and troops marched to Pretoria. President Burgers and the Volksraad of the Republic entered a solemn protest against the annexation. The Convention of January 17th, 1852, bound the British Government to respect the independence of the Transvaal Republic. The annexation is, consequently, a breach of that Convention. But the address accompanying the proclamation of annexation declares that the Convention must be read between the lines, that "he who does not read between the lines sees but half the meaning." The Transvaal people are told that this other half of the meaning is that if they do not become a source of strength to their neighbours, and a strong centre of civilisation and Christianity, they may be annexed!! It is further alleged that a large proportion of the inhabitants of the Transvaal desire the annexation. But they were not invited to sanction it by any formal act, while their representatives in the Volksraad protested against it. The annexation of the Transvaal Republic is a breach of the Convention of January 17th, 1852, by which the British Government is bound, if that Convention is read in the usual way, and not between the lines.

JOHN McCLUER.*

Major Leupe, the learned keeper of charts at the Hague, has already done much for the elucidation of the history of geographical discovery in New Guinea. (See our number for March 1876, p. 72). He has now printed some letters throwing light on the extraordinary career of Captain McCluer, of our East India Company's service, the discoverer of McCluer Bay, at the western end of New Guinea.

John McCluer was one of the earliest of our Indian surveyors. He surveyed the whole west coast of India between 1780 and 1790, the resulting charts being prepared by his second, Lieutenant Wedgborough. Many of his smaller plans were engraved by Dalrymple. McCluer made one of the earliest plans of Bombay Harbour, he was the first to construct a chart of the Persian Gulf with any pretension to accuracy, and was far in advance of his time in his ideas of surveying. The close of Captain McCluer's career was remarkable. In August 1783, the East India Company's packet 'Antelope,' commanded by Captain Henry Wilson, was wrecked at the Pelew Islands. The natives treated the officers and crew with great hospitality, assisted them in building a small ship, and when they sailed in her for Macao in the following November, Captain Wilson took with him a son of the King of the Pelew Islands, named Prince Lee Boo. He was taken to England, and died of small-pox at Rotherhithe on December 27th, 1784. A few years afterwards Captain McCluer was ordered to proceed to the Pelew Islands to report the death of Prince Lee Boo. He was in command of two vessels, the 'Panther' and 'Endeavour,' with Lieutenant Wedgborough as his second. The 'Panther' sailed from Bombay on August 24th, 1790, and reached the Pelew Islands on January 10th, 1791, when the sad news was conveyed to the father of Lee Boo. McCluer had also been ordered to survey the north coast of New Guinea. In February 1791, he left the Pelew Islands, and was engaged in the survey until the following December, discovering the great inlet which was named McCluer Bay. The 'Panther' then returned to the Pelew Islands, when McCluer took a most extraordinary step. On February 2nd, 1793, he addressed a letter to Lieutenant Wedgborough, resigning the command of the 'Panther,' asking for arms and ammunition, which were given him, and announcing his intention of remaining on the islands. This having been arranged, the 'Panther' sailed under the command of Wedgborough, and returned to Bombay in August 1793. McCluer married natives and lived contentedly for thirteen months, when he got anxious for news, and went in an open boat to Macao. There he bought a vessel in order to return to the Pelew Islands for his family, at the same time writing to the Chairman of Directors of the East India Company, with an application to be reinstated in the service. He returned to the islands, took his family on board, and then went to Bencoolen. He sailed from thence, and neither he nor his ship were ever heard of again. But three of his wives had been sent to Bombay in another vessel and arrived safely. In 1797 they were sent back to the Pelew Islands at the Company's expense.

---

* *Captain John McCluer en zijn verrichtingen om de oost,* 1790-1795.

We learn the above particulars from a supplement to the later editions of Keate's *Pelew Islands*, entitled *Supplement to the Account of the Pelew Islands*, compiled from the journals of the 'Panther' and 'Endeavour,' two vessels sent by the H. E. I. C. to those islands in 1790, by the Rev. John Hockin." A chart with the tracks of the 'Panther' and 'Endeavour' on the New Guinea coast, was engraved by Dalrymple.

The letters lately printed at the Hague throw some light on the last few months of McCluer's romantic career. After a search among papers relating to Netherland's India between 1793 and 1798, in the archives at the Hague, Major Leupe discovered copies of two letters from McCluer written in 1795, in which he gives a short account of his adventures. They are addressed to the Chief Commissioner of the affairs of the Dutch East India Company.

The object of McCluer's first letter appears to be to defend himself against a charge of illegal traffic within the Dutch territories. He says that in 1790 he was sent by the English East India Company on a voyage to explore the coast of New Guinea, as it was supposed that there was a navigable passage in the north-east to the Aroe Islands, which might be of service for ships bound to China. He also had to visit the Pelew Islands, to announce the death of Prince Lee Boo, and to take the natives presents in return for their kindness to the crew of the 'Antelope.' During the voyage he was obliged to visit the Moluccas in September 1791, touching at the port of Bouro, where he received much kindness from the Resident. He went thence to Amboyna and Timor, and in October 1792 he reached Batavia. Between these visits he must have executed his New Guinea survey, and discovered McCluer Bay. He says that he went from Batavia to the Pelew Islands, where he remained for some time, to instruct the natives in the use of the presents sent by the Company, despatching the two ships to Bombay in command of the next senior officer. After fifteen months he became wearied of his residence at the Pelew Islands; so he got ready an open boat, and made a voyage to China with four men, reaching Macao in nineteen days. His sufferings during this voyage were very great, and after he recovered he bought a little vessel to return to the Pelew Islands for his family. Just as he was ready to depart, Captain Hayes, of the 'Batavia,' arrived at Macao in July 1794, and said that he had founded a colony in New Guinea, in a place called Restoration Bay. He ordered Captain McCluer to visit it with provisions, saying it was not far out of the way. McCluer consequently went to Manilla for provisions, then to the Pelew Islands, where he embarked his wives, and, finally, to New Guinea, finding the colony in a miserable state, twelve men being dead, fourteen prostrate with illness, and their ship, the 'Duchess of Clarence,' unable to go to sea from want of necessary articles, which McCluer could not supply. He, therefore, went to Bouro to obtain what was required. But on his return voyage eastward he sprung a leak, and was obliged to put into Geby. Having at last arrived in Restoration Bay, the 'Duchess of Clarence' was soon made ready for sea; but as the return of Captain Hayes was daily expected, McCluer waited until the 20th of March 1795. Hearing nothing of him, he sailed, leaving the colonists, whose ship was now ready for sea, to follow when they liked. On arriving at Amboyna he was received, not as a British subject, but as a spy. His ship and himself were placed in charge of a captain of a Dutch spice ship, "whose heart was black." At last he was allowed to sail. He had been accused of having spices on board, and of selling muskets to the Chinese; and this letter, dated April 25th, 1795, at Coupangs Bay, in Timor, is written to exculpate himself. The second letter, dated May 10th, 1795, reports that he left Amboyna on the 12th of April, and expresses the hope that he may receive redress for his treatment there. The letter is written at Fort Marlborough, Bencoolen, and is probably the last ever written by McCluer.

Major Leupe has illustrated the two letters with several explanatory notes. The particulars respecting the unfortunate New Guinea settlement are new to us.

Nova Zembla (1596-1597). The Barents' Relics recovered in the Summer of 1876 by Charles L. W. Gardiner, and presented to the Dutch Government. Described and explained by *J. K. J. de Jonge, Deputy Royal Archivist at the Hague.* Translated, with a preface, by *S. R. Van Campen.* With a map, illustrations, &c. (Trübner, 1877).

In our number for November 1872 (p. 243), we reviewed the pamphlet by Mr. de Jonge entitled *Nova Zembla*, in which he gave the results of his careful examination of the first instalment of Barents' relics, brought home by Captain Carlsen. Lieutenant Koolemans Beynen has since given the complete descriptive list of these relics in his introduction to the new edition of the *Voyages of Barents*, published for the Hakluyt Society, which we reviewed at page 70 of our number for March 1877. In 1876 Mr. Gardiner went to Novaya Zemlya in his yacht 'Glowworm,' closely examined the winter quarters of Barents, and brought back many more relics, which he presented to the Dutch Government. An account of the voyage of the 'Glowworm' will be found in our March number, at page 71. Mr. de Jonge prepared a descriptive list of this second instalment of Barents' relics, a translation of which has now been published by Messrs. Trübner, with a preface by Mr. Van Campen, and an excellent chart showing Mr. Gardiner's track. The former report of Mr. de Jonge was dated July 10th, 1872. The present one, on the relics presented by Mr. Gardiner, is dated December 15th, 1876. It is preceded by a narrative of the proceedings of the 'Glowworm,' and of the circumstances under which Mr. Gardiner presented the collection to Holland. The most interesting relic is the manuscript which, after two days, Mr. de Jonge succeeded in deciphering. It proved to be the "scroll" signed by Barents and Heemskerck, and left at Ice Haven when they departed in the boats, in June 1597. Mr. de Jonge has also made out sufficient in a small manuscript book to be certain that it is the journal of the voyage of Barents in 1594. There are also an account book, a printed hymn book, remains of a Dutch-French dictionary, fragments of an atlas for northern navigation, fragment of a chart of England by Hondius, some coins, a fragment of a cross staff, a small compass in good order by Waghenaar, of Leyden (1584), a crutch which Mr. de Jonge suggests may have been used by Barents, who was very ill when they left their winter quarters—altogether 112 articles. In the first collection brought home by Carlsen there were 78 articles.

——: o :——

Tourists' Guide to the Upper Engadine. Translated from the German of *M. Caviezel.* By *A. M. H.* (London: Stanford. 1877).

The Engadine is the name given to the beautiful valley of the Inn, one of the most important tributaries of the Danube, situated in the south-east portion both of Switzerland and of the Canton Grisons, or Grau Bund. The greater part of the Upper Engadine consists of a long, narrow, elevated plateau about 21 miles long, and varying from 1 to 3 miles in breadth. The lower part is occupied chiefly by wide meadows and pastures, and by dense forests of bright green larches and dark pines, and the upper part by a series of lakes flanked by lateral valleys, well adapted for pedestrian exploration. M. Caviezel dissipates a general illusion about the exceptional severity of the Engadine winter, by proof, based on meteorological observations, that its temperature may be compared with places in Germany and the Tyrol, situated fully 2000 feet lower. The scenery, as we can personally bear witness, is delightful; and the accommodation for English travellers was, at the time of our visit, a few years back, of a very comfortable description—*pace* the recent complaints in the *Times* touching the sewage of Pontresina, a discomfort we did not experience. The present book will prove of very material assistance to an intending visitor to this romantic region. Besides fulfilling all the *desideranda* in a guide-book of the ordinary stamp, it affords, *more Germanico*, full notes on the zoology, botany, and geologic characteristics of the district, and thus enables the traveller to acquire in addition some scientific knowledge of the locality. The book is accompanied by a map, in which heights are not unfrequently laid down, but in which the absence of any hill-shading makes it difficult for the real aspect of the country to be realised. We must observe, in conclusion, that the translator has done his work right well.

——: o :——

Loango und die Loanskuste. Von *Dr. Pechuel-Lösche.* Leipzic. 1876. (London: Trübner & Co.)

Dr. Pechuel-Losche, one of the members of the recent German Expedition to the Loango coast, under Dr. Güssfeldt, has reprinted from the *Mittheilungen* of the Leipzig Geographical Society an interesting little paper of his, of thirty pages, on Loango and the Loango Coast, the name applied to the tract of country intervening between the Atlantic and the slate-mountain range, which marks the ascent to the interior table-land of Africa, from the River Congo, northward to the Bay of Mayumba (6° to 3° 28′ S. latitude). The shape of this tract is that of a narrow isosceles triangle, with a base of about 60 miles, resting on the northern bank of the Congo, and the apex at Cape Matuli. The central portion of this region formed the scene of Dr. Güssfeldt's attempt to penetrate inland, and Dr. Peshuel-Lösche has profited by his sojourn there to put together some very interesting notes on the physical aspect of the country. Taken in conjunction with Captain Burton's lively work, *Gorilla Land and the Cataracts of the Congo*, it affords us a vivid picture of the vicinity of the mouth of the giant river of Africa.

Cartography.

Sheets of the Kumaon and Gurhwal Survey.

With reference to the criticism on Sheet No. 7 of the Survey of Kumaon and British Gurhwal, in our number for August last (p. 214), we understand that the original was drawn by Mr. J. Peyton, who was for many years the best hill draftsman in India, and is still one of the best. The hill-shading of almost the whole of the beautiful maps of Kashmir and Ladak in brush-work, now in the Geographical Department of the India Office, was done by him. As regards Sheet No. 7, he not only drew the map, but the ground also. He is the Surveyor who did the whole of the topography, and we regret the criticism in our August number, to the effect that the sheet is over-laboured with meaningless markings. A topographer so intimately acquainted with the ground as Mr. Peyton would make every mark convey a meaning on his map. It is true that the map looks heavy and inartistic, but this is owing to its being a photo-zincograph, and much inferior to the original. The criticism that in Sheet 21 the mountains are drawn in so different a manner from that employed in Sheet 7, that the two can scarcely be recognised as parts of one design, was made without personal acquaintance with the ground. Sheet 7 contains hills and plains, the former averaging 4000 feet in height, and nowhere more than 7000, and thickly studded with villages. Sheet 21 contains nothing below 8000 feet, and chiefly mountains averaging from 12,000 to 26,000 feet, which are uninhabited. The ground in Sheet 7 was closely surveyed, that in Sheet 21 merely roughly reconnoitred. The method of survey and the nature of the country were totally dissimilar, and, consequently, the sheets could not be uniform. It should be added that Sheet 7 was put on the zinc in the month of August, which is the worst month at Dehra Dún for work of this kind, and hence its heavy appearance. The pressure for immediate publication is so great that the Department cannot afford to wait for the best times of the year to photo-zincograph. If the issue of the maps was delayed in order that they might be lithographed, the inconvenience caused by such delay would be very great, and the cost largely increased.

Stanford's Maps of the Seat of War.

Mr. Stanford's large Map of the Seat of War in Europe is on a scale of 9 miles to the inch, in three sheets. The first sheet embraces the country from Plevna to the Black Sea, and from Bucharest to the Euxine, and is tinted, with the mountains in chalk. Heights are given in English feet, and the leading roads are shown in red. Not only are the mountain ridges and slopes very clearly defined, but much care has been taken to show the width of the river valleys, whether the streams are confined in ravines, or whether they wind through fertile plains. Positions of forests are also indicated. The second sheet is smaller, and is intended to show the country between Plevna and Sophia. It also includes Widdin and Nish. The third sheet embraces the country from Adrianople to Brusa, including Constantinople and the Sea of Marmora, the Dardanelles and Besika Bay. The Map of the Seat of War in Asia is not on so large a scale, 16 miles to an inch, with a larger scale map of Kars and its defences in one corner. The mountains have been drawn with great care, and this is the first good attempt we have seen to exhibit, with clearness and precision, the very complicated system of Armenian highlands. We here find the slopes rising on one side from the Black Sea, and on the other from the Eastern Euphrates to the first elevated terraces, then the second rise, and lastly, the lofty lateral valley, over 6000 feet above the sea, in which Erzeroum is situated, with the Kara-Su flowing in one direction, and the Aras in the other, from a central water-parting. The Soghanlu Dagh, and the descent thence to Kars, with its relation to Ararat and the rest of the Armenian system, are also very clearly defined. We have never before seen these complicated features so well and graphically illustrated. The plains are shown by a pale green tint; but we think that general tints such as are used in the other maps would have been preferable to the broad and strongly-defined colours here used to denote boundaries. The four sheets will prove most valuable companions in tracing the events of the war.

Stanford's Library Map of London.

The new edition of Mr. Stanford's Map of London has been corrected up to the present year, and is now the standard map, and indeed the only correct map of the capital of the British Empire, for the ordnance maps are from seven to ten years old when issued. Miles of fields and market gardens have been converted into streets and squares, and covered with houses and public buildings since the first edition of Stanford's map was issued in 1865. When it is also remembered that *rookeries* have been destroyed, new thoroughfares made, and names of streets in many instances changed, it will be understood what an enormous amount of painstaking labour must have been devoted to the preparation of the new edition. There are a few mistakes in the orthography which should be corrected, as in some instances the origin of a name is historically interesting. Thus, it is not *Cannon* Row, but *Canon*. Row, so called, as Stow tells us, because it belonged to the Dean and Canons of St. Stephen's Chapel. The minutest details will be found correct, even down to the interior ground plans of the Houses of Parliament, the Abbey, the Tower, and public offices. Great care has also been taken to show the railway stations, the starting and terminal points of the principal lines of omnibuses, and the new postal boundaries. The whole map embraces nearly 120 square miles, is divided into twenty-four sheets, and is beautifully engraved.

Log Book.

—:o:—

Use of Arrows by the Arctic Highlanders.—In my paper on the Arctic Highlanders, which forms one of *A Selection of Papers on Arctic Geography and Ethnology, presented to the Arctic Expedition of* 1875 *by the Royal Geographical Society*, at page 185, I say that the Arctic Highlanders have no bows and arrows. My grounds for making this assertion were that neither Kane nor Hayes refer to the use of bows and arrows among the Arctic Highlanders. Yet, singularly enough, the first thing that attracted the notice of Captain Feilden, the Naturalist of the 'Alert,' when he visited the Eskimo hut at Etah on July 29th, 1875, was a well-made arrow tipped with a metal head, and with three rows of feathers to guide it. Just to the eastward of Reindeer Point he found the remains of many old iglus, which appeared to have been long deserted. The roofs had fallen in, and a green mound revealed what was once a dwelling. All around these spots the ground was white with bones. Reindeer skulls and bones were the most numerous. Each bone that had contained marrow was split. The crania were either broken in through the temples, or the backs of the skulls were knocked off, in order to remove the brain. A careful search was made by Captain Feilden, and was rewarded by finding several articles of Eskimo manufacture, bone pins and needles, knives, harpoons, a wooden shade for the eyes, the shafts of two arrows, and a single flint core from which flakes had been struck. These "kitchen-middens" must, he believes, be of very ancient date; and the great quantity of reindeer remains proved to him that the Arctic Highlanders must have preserved some method of procuring these animals. The harpoon or dart would be unfitted for such a purpose; and the arrow shafts explained the presence of the reindeer bones.

The ethnological section of Captain Feilden's investigations will be exceedingly interesting. He has not only minutely examined the remains at Etah, but has traced the wanderings of the tribe up to the furthest point ever reached by uncivilised man, the furthest point, indeed, at which the continued existence of man is possible.

Clements R. Markham.

The Norwegian Deep-Sea Sounding Expedition of 1877.—We gave an account of the arrangements for the Norwegian Deep-Sea Sounding Expedition in our number for August 1876 (p. 223); and we noticed the proceedings during 1876, in our numbers for September (p. 253) and October (p. 276). This year the same vessel, the 'Voringin,' under

Captain Wille, with Professor Mohn on board, left Tromsö on July 14th, and began work off Fuglö, in latitude 71° N. Three cross sections of soundings were made, the greatest depth being 1200 fathoms, on the north-east border of the deep-sea bay, abutting on the steep bank outside Vesteralen and Lofoden. Returning to Tromsö, the 'Voringin' sailed for Jan Mayen, on July 24th. The boundary between the Polar current and the warm Atlantic current (the so-called Gulf Stream) was found to be very steep, like that called the "cold wall," on the American coast. The 'Voringin' was anchored in a bay on the north-west side of Jan Mayen Island, and the scientific party spread in different directions, making collections of plants and rocks. Professor Mohn reports that the chart of Jan Mayen, based on the observations of Zorgdrager and Scoresby is accurate, except that the island is placed too far east by about half a degree of longitude. The height of Mount Beerenberg was 5836 feet, nearly 1000 feet lower than the height given by Scoresby. A depth of 1032 fathoms was found 7 miles north-west of Jan Mayen. On August 23rd the expedition returned to Bergen, with very satisfactory results. Next year the Norwegian Expedition will examine the region between North Cape, Jan Mayen, and the north of Spitzbergen, and possibly make a trip eastwards, in the direction of Novaya Zemlya, to determine the position of the isothermal line of 0° C. at the sea bottom, this line being considered the limit of the range of cod fish. The Norwegian Storthing has already voted the necessary grant for the Expedition of 1878.

Arctic Scientific Stations.—Count Wilzek and Lieutenant Weyprecht have published a programme of work for the proposed international Polar expeditions. The object is to obtain a set of meteorological, magnetic, and glacial observations extending over a complete year. The stations are to be on the north coasts of Greenland and Novaya Zemlya; in Finmark, near the North Cape; at the mouth of the Lena, in Siberia; at Point Barrow, in America; at one of the Danish settlements of Greenland; and on the east-coast of Greenland, near 75° N. The programme contains detailed instructions with reference to the registration of the observations. We trust that, before long, the English Government may be induced to undertake the East Greenland Station, which will serve as a depôt to an advanced expedition to the northward, employed on the more important work of geographical discovery.

The Programme was prepared in May 1877, to be discussed at the International Meteorological Congress to be held at Rome last September, but which was adjourned until next year.

Exploration in Northern Russia.—News has been received from M. Kelsief, who has been making researches during the past summer along the Murmanian coast and in Lapland, for the Moscow Anthropological Exhibition of 1879. M. Kelsief had been travelling with M. Singer, Secretary of the Natural History Society; and the two had, up to the time of their parting company on the borders of the White Sea, made a good collection of stone implements and other pre-historic remains. M. Kelsief then took a cruise in a small vessel, and traversed, with considerable difficulty, about 800 versts in all in the White and Polar Seas, and passed the whole of the summer within the Arctic circle. Along the Murmanian coast he visited the Lapps, who inhabit, there, subterranean dwellings, grouped at intervals of between 70 and 100 versts. He was accompanied by only one servant, and, after enduring considerable hardships through exposure and insufficiency of food, he started on the 29th August for the north of Finland, where he proposes to visit the Lapps of Lake Enara, and to return to St. Petersburg by way of Tornea.

Exploration of Upper Indus.—The portion of the Indus River where it emerges from Kashmir territory, and flows through the mountainous region of Gilgit and Chilas to rejoin our frontier near Darband—a strip in all of about 120 miles in length—has just received detailed exploration at the hands of a Punjab surveyor. This piece of work will complete our geographical knowledge of this river, and will contribute useful topographical information to our future maps, though it must be remembered that the general course of the river had been pretty accurately determined in 1870 by Captain Carter's careful triangulation of the peaks flanking its eastern and western banks.

M. Savorgnan de Brazza on the Ogowai River.—M. Savorgnan de Brazza writes, under date of the 17th of June, to say that his expedition had arrived at Doume, a village on the extreme verge of the Aduma country, situated on the Ogowai River, and in 0° 56′ S. latitude and 11° longitude east of Paris. He and his fellow travellers were in rather better health than they had been, and were intending to start eastward for the Ponbara falls, which, according to native report, are about 100 miles beyond Doume. Beyond these falls the direction of the Ogowai up stream is supposed to diverge somewhat southward and then to lie eastward. M. S. de Brazza reports that slavery is very rife on the river, and that the negroes sell their children, brothers, and friends, without the least compunction, to the slave dealers. He states that he has already come across several tribes, the names of which occur in Dr. Petermann's map, but at some considerable distance from where they really turn out to be, viz., M'Bamba or Obambe, Shake, Umbete, Bateke (a people who bring hither merchandise from the Congo), Anumbo, &c. The River Libumbay, which some geographers have described as a northern affluent of the Congo, turns out to be a feeder of the Ogowai on its left bank.

Belgian Expedition for the Exploration of Central Africa.—We learn from the *Bulletin* of the Belgian Academy of Sciences that an expedition has left Belgium for the exploration of Central Africa. Dr. Maes, of Hasselt, accompanies the expedition as Surgeon and Naturalist. The first Belgian station in Central Africa will be placed under the direction of Captain Crespel, assisted by Dr. Maes and Lieutenant Gambier. On arriving at Tanganyika, measures will be taken to ascertain whether it is possible to found a station on the shores of the lake, or, leaving a depôt there, it be fixed at Nyangwe or elsewhere in Manyuema. The place decided upon will act as a basis for further exploration, and agriculture will be carried on in order to make the expedition self-supporting.

Professor W. M. Gabb's Surveys in Costa Rica.—Dr. Petermann has published a map of Costa Rica showing the results of Professor Gabb's surveys made in 1873-4. He shows that our geographical knowledge of this country, up to 1873, was, for a civilised state, of the meagrest and most unsatisfactory character, and that the only parts of the country which had been actually surveyed were the east and west coasts, and the cross country route from Puerto Simon *viâ* Cartago and San José to Punta Arenas (and this, we cannot help exclaiming parenthetically, was the sum of our geographical knowledge of a state on which the confiding British capitalist eagerly showered down loans amounting to 3,400,000*l.* ! !). In the years referred to, Professor W. M. Gabb, an American geologist and traveller, already known for his researches in the Californian peninsula, and in the eastern part of Haiti, surveyed and explored the entire district or province of Talamanca, which occupies the south-eastern portion of the Republic, and thus performed a very serviceable and important geographical exploit. Dr. Petermann has been in possession of this survey for nearly three years, but withheld the same from publication, apparently under the impression that it had been reproduced in the Republic. The amount of detail shown by the survey contrasts strongly with the still unexplored tracts lying to the west and north.

Correspondence.

——:o:——

POLYNESIAN MIGRATION.

To the Editor of the "Geographical Magazine."

Sir,—Without entering into any discussion on the subject of the origin of the Polynesian races, the following particulars of the loss by fire, the abandoning, and the subsequent drift of the ship 'Ida Iredale' speak for themselves.

Having for four years traded in the South Pacific, amongst various groups of islands, I have bestowed some study to the subject of Polynesian ethnology, and through the courtesy of the owner of the 'Ida Iredale,' I am informed that the particulars are correct, excepting that the latitude should have been stated as 13° 20′ South, instead of 12° 20′.

Better evidence of the winds and currents of this part of the Pacific Ocean could scarcely be obtained, and it goes far to uphold the theory of some thinkers, that the generally accepted opinions of the Malayan origin of the Polynesians is not so certain after all.

I am, &c.,

John Findlay, F.R.G.S.

10, Belmont Crescent, Glasgow.

"Extraordinary Voyage of a Burning and Abandoned Ship.—Her Majesty's Consul at Papeete, Tahiti, has forwarded to the Board of Trade a report as to the discovery of the derelict hull of the British ship 'Ida Iredale,' which was abandoned on October 15th, in the South Pacific, in lat. 12° 20′ S., long. 107° 45′ W., on fire from the spontaneous combustion of her cargo of coals. The crew of the vessel were landed at Tahiti, a distance of 2350 miles from the place where she was abandoned, in the month of December last. It now appears from the report of Consul Miller that on the 9th of June the steam corvette 'Seignelay,' a powerful vessel of the French Navy, was preparing to leave Papeete for the Paumoto Islands, when it was reported that a dismasted and abandoned ship was drifting off the western side of the island. The 'Seignelay' at once proceeded in the direction indicated, and fell in with the derelict 15 miles off Papeete. A hawser was made fast, and with considerable difficulty, owing to the rough sea and the unweildy bulk of the derelict, it was towed into Papeete harbour. From the still remaining marks, it was clearly identified as the 'Ida Iredale,' and was delivered over to the local authorities. A few days later an inspection of the hull was made by Consul Miller and Captain Turpie, master of the London missionary vessel 'John Williams.' Captain Turpie drew up a report of its condition, which was certified by Mr. Miller, and is enclosed by that gentleman in his despatch to the Board. Captain Turpie says:—" The whole of the woodwork, indeed everything combustible, has been consumed, leaving only the ironwork of what was once a remarkably strong and substantial vessel. The foremast has fallen over the port side and has entirely disappeared from the deck upwards. The bowsprit with a portion of the jibboom, still remains, though displaced from its position. The main and mizen lower masts, with all ironwork attached, remain within the structure, having fallen in. The bread and water tanks have evidently exploded after generating steam. The whole frame from 'tween-deck beams is sadly distorted and twisted by the action of the fire. Many of the beams are broken by the weight of deck fittings, &c. The collision bulkhead still appears intact. There still remains, I should suppose, about 100 tons of ashes and *débris*, which are still burning. No water is visible in the hold, and the iron plates of the ship outwardly appear little damaged. The bottom is clean, kept so, I imagine, by the intense heat. The figurehead is uninjured. From the position where she was abandoned to this place is about 2350 miles. The ship has, therefore, driven that distance between October 15, 1876, and June 9, 1877. The course made by the burning wreck I suppose to be about W.S.W., south of the Paumoto group; then meeting with the S.E. winds which prevail during April, May, and June, she has driven to the N.W. until taken in tow by the French man-of-war. It is a most remarkable thing that a burning ship should have driven over eight months in the Pacific without being reported, and that she should at last be brought into the port which her captain and crew had reached seven months previously.' The 'Ida Iredale' was a fine ship of 997 tons, built at Harrington in 1872, and owned by Mr. Peter Iredale, of Liverpool, She sailed last from Ardrossan."—*Shipping and Mercantile Gazette.*

——:o:——

Funeral Ceremonies at the Nicobar Islands.

(Extract from a letter of F. E. Tuson, Esq.)

"Last night I went over to Malacca, and found that one of the old men had died suddenly, and been buried just before I got there. A raft of long trunks of trees, with a house on it made of cocoanut leaves, and with one large leaf placed upright to act as a sail, was lying opposite the dead man's hut, to convey away his 'iwi,' or spirit, when the 'maulooennas,' or medicine men, had caught it. They are awfully afraid of these 'iwis;' and all the inhabitants were sitting in their houses, afraid to move out. They attribute all fever, and sickness, and calamity, to their 'iwis.' I found the 'maulooennas' placing all the property of the deceased round about his tomb, and hanging up his hats, clothes, &c., on a post placed at his head. Everything a man or woman possesses is placed on his or her tomb, and never used again; the poultry and pigs are killed. The widow was in a house near, which was full of all the women in the place. She has to sit three days in a dark corner, with a cloth over her, and to see and speak to no one during that time. The 'iwi,' it seemed, would not come till night-time, when everything was quiet, so I was unable to see the operation of catching it, but I found out the mode of procedure. The first thing was to eat up all the food in the village, with the exception of a little rice and bread-fruit, &c. The latter was placed in little pottles, like those used at home for strawberries, of a conical shape, about 2 feet long and 8 inches in diameter. These were hung about the dead man's hut and tomb. At night the 'iwi' was supposed to come and enter one of the pottles, to eat the food in it. The maulooennas would then steal up, and close the mouth suddenly and tie it up. It is then carried with great care to the raft, which is towed out to sea and let go. I saw the pottles all ready, neatly made of cocoanut leaves plaited together. I was told that the 'iwi' was invisible to all but the 'maulooennas,' an idea started, of course, by the latter. The natives all seem to believe in their powers; but whether they do so themselves, I do not know. It does not seem necessary to pack the 'iwi' off the same day the man dies; for the other day the sister of 'London,' the headman of Malacca, died, and her 'iwi' was not sent to sea till three months afterwards. The maulooennas appoint the day. Three months hence they will have a great feast, paint their faces red, and all get drunk and dance for two or three days. At the end of a year the body is dug up, and the skull thoroughly cleaned and re-buried. I have not ascertained the reason for this last ceremony. These people are a most interesting race, and very little is known about them."

Proceedings of Geographical Societies.

—:o:—

HAMBURG GEOGRAPHICAL SOCIETY.

Meeting of 4th October, 1877.

DR. KIRCHENPAUER, Burgomaster, in the chair. The PRESIDENT made reference to the fiftieth anniversary meeting of German Investigators into Natural Science, which had been held during the 17th-23rd September in Munich.

HERR FRIEDERICHSEN read a paper on Costa-Rican geography, called forth by criticisms of Dr. Potakofsky in Berlin and Dr. Petermann in Gotha on his (Friederichsen's) Map of Costa Rica, published in 1875. He quoted the favourable opinion expressed by Professor Von Seebach, of Gottingen, one of the best-known authorities on Costa Rica, on the geographical value of his map; and with reference to Dr. Petermann's remark, that he (Dr. Petermann) had been in possession of the extensive surveys made by Professor Gabb in Talamanca, in the south-east of the country, for three years, Herr Friederichsen stated that he himself had been making efforts for some time to obtain Gabb's original surveys, but without success, as they had remained unpublished and unutilised until Dr. Petermann brought them out. Herr Friederichsen also observed that in Dr. Petermann's map there occur the names of certain Indian tribes, Orotiñans and Guetares, on the Gulf of Nicoya, where, according to Gabb, no Indians live, and that the height of Pico Blanco, in Talamanca, is given as 9652 feet while, according to the same authority, it ought to be 11,877 feet.

—:o:—

SPANISH GEOGRAPHICAL SOCIETY.

THE *Boletin* for August (Tom iii. No. 2) contains a paper by the President, Don Francisco Coello, completing the account of the proceedings of the African International Association. Spain was worthily represented by Don Rafael Merry del Val and Don Pascual de Gayangos.

This number also has a very curious account, by Captain Don Cesareo Fernandez Dero of the Spanish Royal Navy, of two Spanish travellers in Morocco. Early in the present century a traveller arrived at Ceuta, who gave his name as Ali Bey Abbassi, son of Othman Bey, and Prince of the illustrious House of the Abbassides. He gave out that he wished to visit the countries of true believers in Africa, on his way to Mecca. The traveller knew the language and literature of the Arabs; he was attended by servants and surrounded with luxuries, he was prodigal in his gifts, and a man of great learning. The Emperor of Morocco received him as a Sherif and Prince, and all mosques and fortresses were open to him during his residence in the country from 1803 to 1805. He was neither Prince nor Muslim, but an adventurer from Barcelona, named Domingo Badia, a man of great knowledge, a perfect linguist, cool and courageous, and with those rare qualities which enabled him to act so difficult a part with success. He succeeded in fixing the geographical positions of several places in Morocco, made natural history collections, and eventually printed a book entitled the *Travels of Ali Bey el Abbassi*.

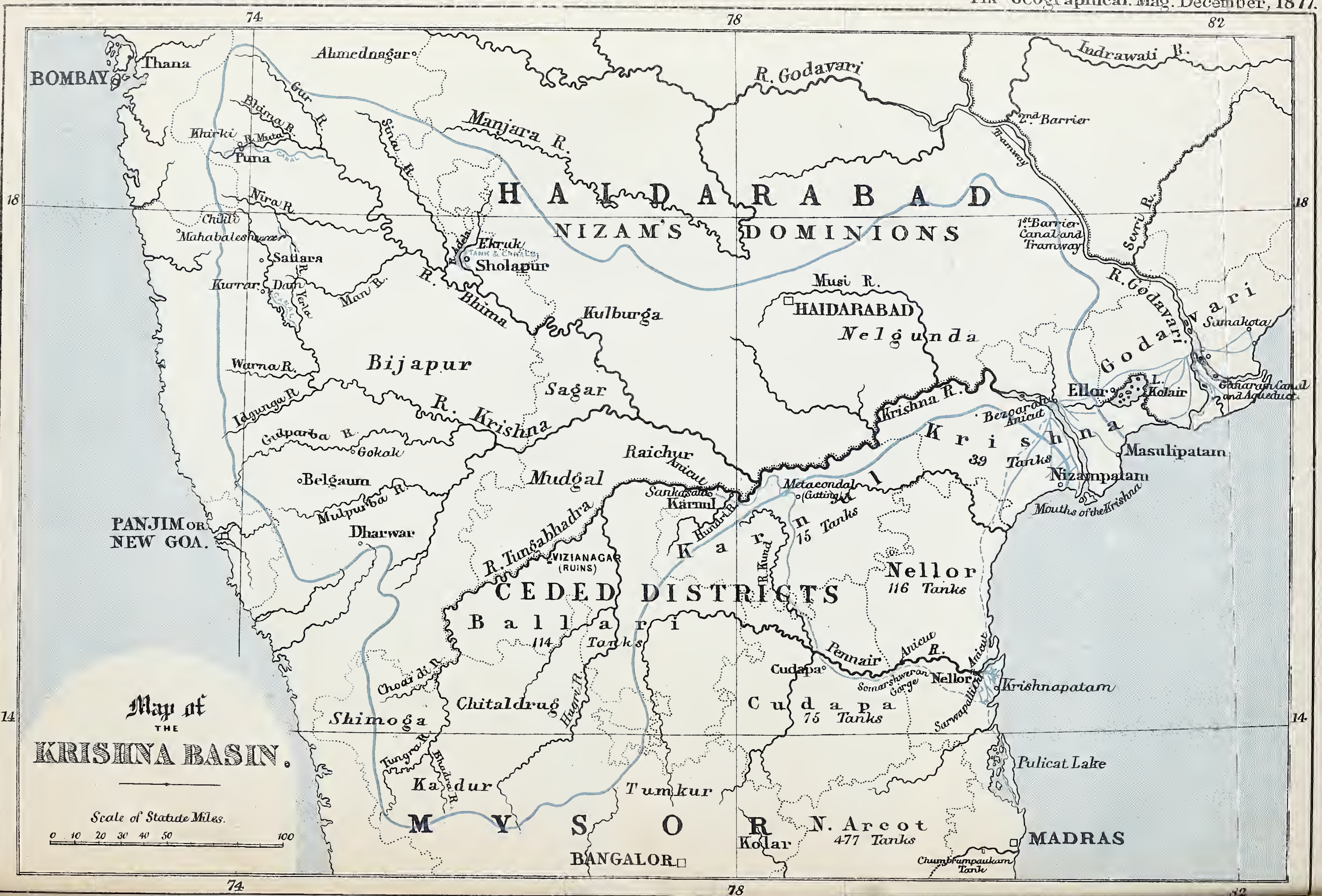
Sixty years afterwards, in 1863, another traveller appeared on the coast of Barbary who gave out that he was Hajji Muhammad el Baghdadi. He also travelled over the greater part of Morocco, and wrote another book of observations and remarks on his journeys. But he travelled in a very different way from his predecessor. He affected poverty, and mingled with the lowest classes of the people. On his return to Spain he wrote a thoughtful and very curious book, which is infinitely superior to that of the so-called "Ali Bey el Abbassi." This second traveller was really Don José Maria de Murga y Magartegui, born at Bilbao, of good family, handsome, judicious, talented, and gifted with a great facility for learning languages. After studying at a college in Madrid he entered a cavalry regiment, and then travelled in England and Scotland, going thence to the Crimea during the siege of Sebastopol. Finally he undertook his remarkable journey to Morocco. His work is entitled *Recollections of Morocco by the Biscayan Moor, José Maria de Murga, or the Hajji Muhammad el Baghdadi* (Bilbao, 1868). It consists of a series of studies on the origin of the Sherifs, on the Moors, Arabs, Berbers, Jews, and Negroes. But the most curious chapter is on the "Renegades: a monograph on a family approaching extinction, and which was not described by Buffon; written by José Maria de Murga, who was a member of the family *in partibus infidelium*." In April 1873 he was in Morocco a second time, kept a careful journal, and returned in October. He went to Fez, Mequinez, Morocco, and Mogador, returning by Mazagan and Rabat to Tangiers. Long and very interesting extracts from his journal are given in the *Boletin*, as well as copies of some letters. He was on the point of setting out on a third expedition, when he died at Cadiz on the 1st of December 1876, being forty-nine years of age. It is to be hoped that the journals of Señor Murga, who was evidently an observant as well as an intrepid traveller, may find a suitable editor, and be published.

The *Boletin* next publishes an account of the levellings in Spain, which follow the lines of the principal roads, with tabulated lists; and concludes with the usual miscellaneous geographical notes.

NOTICE.

The Office of THE GEOGRAPHICAL MAGAZINE *is at* 57 & 59, *Ludgate Hill, E.C.*

Manuscripts sent to the Editor cannot be returned, nor can the Editor be responsible for them.



Map of the KRISHNA BASIN.

Scale of Statute Miles.

THE

GEOGRAPHICAL MAGAZINE.

DECEMBER, 1877.

IRRIGATION IN SOUTHERN INDIA.

IV.

The Basin of the Krishna.

The catchment basin of the river Krishna includes a great part of the region which has been the principal scene of the recent famine, and over which the rainfall is less than 30 inches in the year. This dry region comprises part of the Deccan, several districts of the Bombay and Madras Presidencies, all within the Krishna system, as well as that part of Mysor within the basins of the Krishna, Kaveri, and Pennair. Consequently the waters flowing from the part of the ghâts which overhangs this dry belt have a most important function. Upon its careful storage and distribution depends the existence of the inhabitants of a country 94,500 square miles in extent. For that is the area of the Krishna River basin. The streams whose fountains are in the Western Ghâts from about 13° 50′ N. to 19° 50′ N., a distance of 360 miles, all flow into the Krishna, the length of the main river being 800 miles.

The source of the Krishna is in the Mahabaleshwar Hills, within 40 miles of the western coast of India, together with those of its tributaries the Koina and Yena. The temple of Maha Deo, at Mahabaleshwar, is built at the foot of a steep hill, overlooking a deep ravine, and has an open space in front. The exterior is faced with pilasters painted yellow, the intermediate spaces being red. In the centre there is an arched doorway leading into an interior cloister built round a tank, into which a stream of water pours out of a cow's mouth. This is the source of the river, considered as the deity in a female form, and often spoken of as Krishna Bai, or the Lady Krishna. Tall trees and bushes cover the sides of the hill, such as roses, daturas, and jambul trees with heads of graceful white feathery flowers. The total rainfall, on these hills, which are only 4500 feet above the sea, is 200 to 220 inches.

Descending rapidly from its source, the Krishna flows past the beautiful city of Wai with its temples, and handsome flights of stone steps, and lovely Brahman women. It then enters the Satara district, and commences its beneficent irrigating work, in the face of special difficulties. The rivers, in the Krishna system within the Bombay Presidency, have so slight a slope that their fall would not gain much on that of a canal, while the steep transverse slopes of the valleys prevent canals from being taken to any distance from their parent streams. The rivers are filled at the time of rains, but during the long dry season of eight months they become mere threads. Here the objects are the retention of supplies of water which run to waste during the rains, and the command of the barren lands on the sides of the valleys. The principal work on the upper part of the course of the Krishna is called the Krishna Canal. A dam is thrown across the bed of the river at Kurvar in the Satara district, provided with scouring and regulating sluices. Thence a canal is taken with a slope of a foot a mile, and a course parallel to that of the river at first, but eventually receding from the bank so as to command a larger area of land, the number of acres irrigated being 1825. Within the same district the canals from the Yerla, Rewari, Chikli, and Gundauli tributaries irrigate 997 acres; and the Magni tank and canal works, 348. The canals from the Yerla River alone, if supplied during the dry season from storage tanks, would irrigate the area of 12,000 acres which they command. The projected Nehn Tank will effect this object. It will require an earthen dam 4400 feet long, with a greatest height of 63 feet. The drainage area above the tank is 60 square miles, and the average rainfall 24 inches. Another scheme, in Satara, is the construction of the Pingli Tank, on a tributary of the Máu River, in one of the driest tracts of the Deccan, with a fall of only 24 inches. A dam 53 feet high will impound $195\frac{1}{4}$ millions of cubic feet of water, and the tank will command 3000 acres by means of the Gundauli Canal.*

From the north the Krishna receives the River Bhima, draining, with its tributaries, the Sina, Nira, and Muta, the districts of Ahmednagar, Poona, and Sholapur.† The most important work in the basin of the Bhima is that for the water supply of Poona and Kirki. It consists of a masonry dam of great height and 2900 feet long, at Kharakwasla, across the Muta Valley, to form a reservoir. Two open ducts lead the water to Poona and Kirki, where the water is distributed by iron pipes. The canals are still under construction, and, when completed, will supply a large area with irrigation. The Ekruk tank, 4 miles north of the town of Sholapur, is on the Adíla, another tributary of the Bhima. The dam across the Adíla Valley is 7200 feet long, and 72 feet high in the centre, with a waste weir at the east end. A lake is thus formed, with an area of 6½ square miles, and 35,840 acres are brought under its influence by means of three channels. The dam was completed in 1869.

---

* Satara has an area of 5378 square miles, with a population of 1,116,050 souls, or 208 to the square mile.

† Ahmednagar has an area of 6647, Poona of 5099, and Sholapur of 3925 square miles, with populations of 773,938, 907,235, and 662,986 respectively, being 116, 178, and 169 to the square mile.

From the south, and within the Bombay Presidency, the Krishna receives the Rivers Gatparba and Malparba, which drain the districts of Belgaum and Dharwar. The Gatparba has an independent course of 160 miles; and about 35 miles north-east of the town of Belgaum the river drops over a perpendicular quartz rock 176 feet high, forming the beautiful Falls of Gokak. In the rains the river is 180 yards wide, and temples, sacred to Mahadeo, are built on either side of the cataract. There are several proposals for utilising the waters of the Gatparba and Malparba, by a canal from the former river at Gokak, by a canal from the Malparba into the Dharwàr plains, for completing the Kalhola-nullah, Churdi, and Maddak tanks. But the latter scheme is the only one that has been carried out. Belgaum has an area of 4592 square miles, and a population of 938,750, or 204 to the square mile. Dharwar, in an area of 4565 square miles, has a population of 988,037, or 216 to the square mile.

Most of the irrigation work in the Bombay districts within the basin of the Krishna has yet to be accomplished. Many great reservoirs for the storage of water, in this part of the basin, might be constructed, besides those which I have enumerated. For instance, Colonel Meadows Taylor, in his journey to Ahmednagar in 1853, mentioned how much he was struck with the capabilities of the country for large irrigation works, and, in particular, for tanks. Streams descending from the table-lands to the north, and flowing into the Sina, afford ample supplies of water, and the ground, from its peculiar character, provides most convenient basins, only requiring dams to be converted into large tanks. Until all this storage work is executed, the people will be exposed to periodical visitations of famine. It must always be remembered that improved communications can only afford the means of relieving, not of preventing scarcity of food.

After entering the territories of the Nizam, the Krishna leaves the table-land of the Deccan, and falls, by a descent of 408 feet in about three miles, into the lower level of Shorapur. Here, in the floods, there is a magnificent broken volume of water, rushing down an incline of granite with a mighty roar, and a cloud of spray dashing up high into the air. The Krishna then receives the Bhima, its chief northern tributary, and forms the northern boundary of the Raichur Doab, until it unites with its great southern affluent, the Tungabhadra. The country of Shorapur, between the Krishna and Bhima, was the scene of Colonel Meadows Taylor's administrative labours from 1841 to 1853, and irrigation received a full share of attention at his hands. His first essay at irrigation works was the repair and extension of the lake at Bohnal,* and it proved a complete success. He made it into a sheet of water 2½ square miles in area. His new tank at Kuchaknur, near Bohnal, has an area of 6¼ square miles, and a dam 1872 yards in length, irrigating 10,000 *bigahs* of rice.

The great southern tributary of the Krishna, the Tungabhadra, has its sources in Mysor. It is formed by the confluence of the twin streams, Tunga and Bhadra, at Kudali, nine miles N.N.E. of the town of Shimoga.* It then flows northwards, receiving the rivers Warda, Choardi, and Kumadvati, and, on leaving Mysor, forms the boundary between the Madras and Bombay Presidencies, with the district of Bellari on the right, and that of Dharwar on the left bank. The Tunga, 149 miles long, has a catchment basin of 1389 square miles, of which area the drainage of 100 square miles is intercepted by tanks; the Bhadra, 160 miles long, has the drainage of 175 square miles, intercepted by tanks, out of an area of 1675; the Warda, 47 miles long, has the drainage of 180 out of 610 square miles, intercepted by tanks; and the Choardi, 43 miles long, has the whole area of its catchment basin—510 square miles—fully utilised. The Tungabhadra is never dry, and in the rainy season it swells prodigiously, and forms a rapid and muddy stream, ten feet higher than the rocks which stand out in its bed during the dry season. Its four sources, the Tunga, Bhadra, Choardi, and Warda, drain an area of 3754 square miles in Mysor, chiefly mountainous country, with a rainfall of 135 inches in the year. After the united stream enters the plains, it flows through a region where the rainfall is only 24 inches. The ancient name of the river is the "Pampa," by which it is mentioned in the Ramayana. The tradition is that Hiranyaksha, son of the Rishi Kasyapa, seized the earth, and bore it down to the lower world; upon which, Vishnu, assuming the form of the *varáha*, or boar, plunged into the ocean and brought up the earth again. The perspiration arising from this exertion trickled down the boar's tusks, and formed two streams, that from the left tusk being the Tunga, and that from the right tusk the Bhadra.

In the Bellari district the Tungabhadra has long been used for irrigation. At Desanur and Siragupa there are two *anicuts*, by which 2519 acres are irrigated. Next come the Valabapur and Korragul *anicuts*, being two branches, with an island between. The former is a reconstruction of an old native work, consisting of loose masses of stone. It is now of solid masonry, with *chunam*, and is 994 feet long. The ancient work was built by Krishna Rayel, the King of Vijiyanagar, in 1521 A.D. The Korragul is 400 yards long, of rough native work. Next comes the Ramanagadda *anicut*, across the western branch of the river, opposite the Island of Kuravagadda, and the Kuravagadda *anicut* crosses the eastern branch. The Roya channel is turned out of the river above this *anicut*, and has a tortuous course of 217 miles, ending in the Kamlapur tank. The Bella *anicut* is just above the village of Hossur, an ancient native work, concave towards the stream, only extending from the right bank to an island, and the channel from it is but 4½ miles long, then dividing into several smaller channels. The Turut *anicut* is taken across the river about a mile west of the old city of Hampi, and is formed of a number of bits of masonry, connecting islands and rocks. The channel from it is very tortuous. The Ramsagra *anicut* is an old, rough stone dam, running diagonally up the river, connecting islands and rocks. Its channel is 9½ miles long, and tolerably straight. The Kampli *anicut* also consists of detached pieces. The last dam is called Taumbiganur, whence the Rampur channel flows for 7 miles. All these *anicuts*, except the new one at Valabapur, were built by the ancient Kings of Vijiyanagar. The total length of the nine channels taken from them is 89¾ miles. There are also eight large tanks in the Bellari district, securing cultivation to 29,728 acres.

---

* *See* his Life, ii. p. 37.

* The Mysor district of Shimoga, including the basins of these sources of the Tungabhadra, has an area of 3797 square miles, with a population of 498,976, or 131 to the square mile.

The Kings of Vijiyanagar did all in their power to fertilise the arid region over which they ruled from 1034 to 1524. Abdu-'r-Rizzak, the Envoy of Shah Rokh, in 1441, and the Italian Nicolo Conti soon afterwards, visited Bijayanagar, and both describe the magnificence of this city on the banks of the Tungabhadra, now a silent and desolate mass of ruins. Channels of water flowed through the streets and irrigated the gardens, while the larger channels from the *anicuts* were extensively employed for the cultivation of rice, sugar cane, cocoa nut, turmeric, and especially ginger. Many noble tanks, the largest nearly three square miles in area, were also constructed by the Kings of Vijiyanagar. Abdu-'r-Rizzak tells us that the country was well cultivated and very fertile, and that the city of Vijiyanagar was such that the pupil of the eye has never seen a place like it.

The people of the Bellari district have suffered sorely from the famine, and the English, as the successors of the Vijiyanagar Rajahs, are bound not only to maintain, but to extend and complete the irrigation works. The way is clear, and even detailed surveys have been executed by Mr. Gordon. The Bukkacherla project would have the effect of irrigating 11,000 more acres. The Ruddam project will add 1344 more, the Hindipur project will secure to eleven tanks a regular supply of water; and the Bomanahalli project is designed to form a reservoir capable of storing sufficient water to irrigate 64,000 acres. The water is to be distributed by two channels. Then there are the two schemes of the Madras Irrigation Company which have not yet obtained sanction. The first is for a canal to be taken from the Tungabhadra at Valabapur, to cross the hills near Daroji by a deep cutting and a tunnel 450 yards long, and then to take a nearly straight line to Bellari. Mr. Gordon completed his surveys for this project in 1867, ten years ago. It would have irrigated 150,000 acres. Another project would lead a canal from the Tungabhadra at Hossur, pass round the hills instead of through them, and thence go to Bellari. It is designed to irrigate 212,000 acres. The whole cost of these works would be 950,000*l.*, the interest on which at 5 per cent. is 47,500*l.* In 1854 about four times that amount was wasted by hurried expenditure on famine roads, and by remissions, besides the loss to the people of their crops and cattle. These facts speak for themselves. The famines in Bellari are mainly due to the persistent refusals to sanction the execution of feasible and well-matured irrigation schemes.

An important tributary of the Tungabhadra, coming from the Mysor district of Chitaldrug, is the River Vedavati, or Hagari. It is formed by two streams, the Veda and the Avati, both rising in the Baba Budan Mountains, and has a catchment basin of 2250 square miles, with a rainfall of 24 inches. It flows through the central belt of hills by the pass called Mári-Kanive, and soon after leaving Mysor receives a tributary called the Janagi-halla, or Chinna Hagari. It is a very shallow river, and presents a broad bed of sand in the dry season. The Hagari has a course of 114 miles in Mysor, with a catchment basin of 5295 square miles, of which 4097 have their drainage intercepted by tanks, and that of 1198 is not utilised. The Chinna Hagari is 53 miles long. Out of the 524 square miles of its basin, the drainage of 356 is intercepted by tanks. A number of small channels are drawn from the Hagari, in the Kadur district of Mysor; but the great project which would fully utilise its waters is still neglected. This is the construction of an embankment in the Mári-Kanive gorge, and the consequent creation of an immense reservoir that would irrigate 50,000 acres of the fertile but now arid plains of Hiriyur.* At the time of Dr. Buchanan Hamilton's tour in 1800,† this Mári-Kanive gorge, in the Chitaldrug Hills, was pointed out as a spot peculiarly favourable for the construction of a dam. But nothing has ever been done, and this is the more to be deplored because large sums have been spent in surveys and measurements. The whole Krishna system, within Mysor, has a united length of 611 miles, and a catchment basin with an area of 11,031 square miles. Out of this, the drainage of 6217, or 56 per cent., is intercepted by tanks.

After entering Bellari, there are channels taken from the Haggari which irrigate 1500 acres; and it falls into the Tungabhadra 72 miles above Karnúl. The Pennair is another river which, though not perennial, brings down large volumes of water with its freshes. It has a course of 100 miles in the Bellari district, and the construction of a few *anicuts* would change the face of the country. The Bellari district, with an area of 11,007 square miles, has a population of 1,668,006, or 152 to the square mile.

No region in India is more dependent on adequate supplies of water for the existence of its inhabitants than the Ceded Districts of the Madras Presidency; and when the Madras Irrigation Company was formed in 1860, with a capital of 1,000,000*l.*, having interest at 5 per cent. guaranteed by Government, the Ceded Districts were selected as the scene of its operations.

The project of this company was partially sanctioned in 1861. It was to divert, by means of an *anicut* at Sankasala, 17 miles above Karnúl, a portion of the flood waters of the Tungabhadra into the valley of the Pennair, through a capacious canal along the right bank of the former river, and across high land, forming its watershed to the east. But the other parts of the project, including the works for irrigating the Bellari district, and the construction of large reservoirs for the storage of water have not been sanctioned.

The refusal to sanction the construction of these reservoirs ensured the failure of the enterprise. From June to November there is abundance of water available from the Tungabhadra, which now runs to waste. But from November to June not a drop can be allowed to be abstracted from that river without injury to the Krishna delta irrigation. Capacious reservoirs for storage were, therefore, essential to provide for the summer supply of water. One would have been the Mári-Kanive, another would have been in the Hindri Valley, covering an area of 28 square miles, and another at Kara Bellegal, about 30 miles from Karnúl. Large reservoirs were also to have been constructed at Mudaba, on the Tunga; at Lakkawali, on the Bhadra; and at Masur, on the Choardi. But permission to undertake these absolutely necessary works has been refused.

---

* The Mysor district of Chitaldrug, which comprises Hiriyur, has an area of 4471 square miles, with a population of 531,360, or 119 to the square mile.

† See Buchanan's *Mysore* (2nd ed.), ii., p. 458.

At Sankasala an *anicut*, 12 feet high and 1500 yards long, was thrown across the Tungabhadra. From its right flank the main canal is carried parallel to the river for 17 miles, with only one bank, from 16 to 34 feet high, the other being formed by the natural rise of the ground. Thus a quantity of land is submerged, while the single bank is subjected to violent action from the waves, owing to the extensive spread of water. Close to Karnúl the canal is taken across the Hindri River, on a fine aqueduct. At Metakondal, 72 miles from Sankasala, there is a cutting a mile long which takes the canal from the Krishna basin, across the water-parting, into that of the Pennair, descending the valley of the tributary Kolair into the Pennair itself, by a succession of locks, in a fall of 236 feet. The canal is completed from the Sankasala *anicut* on the Tungabhadra to the Pennair, a distance of 143 miles, but not so as to be capable of bearing the full amount of water, owing to weakness of construction. Another defect is, that sufficiency of waterway is not provided for the passage of flood waters, either under the canal or by surplus weirs in its banks, for the escape of storm waters entering it when full.

Water was first admitted into the main canal at Sankasala on the 10th of July 1864. In 1866, the original sum of 1,000,000*l.* having been found insufficient, the Secretary of State sanctioned the addition of 600,000*l.* to the Company's capital, also with a guaranteed interest of 5 per cent., on condition that the canal, as far as the Pennair, was completed by July 1871. By that date the main canal was made, all the sluices in it were built, and the channels for distribution were in progress, 216 miles of them, commanding 91,567 acres, being finished. But if the full amount of water was admitted into the canal the embankments and walls would fail at many places. The total expenditure on the canal, in India, up to 1876 has been 1,583,308*l.* The extent of irrigation in Karnúl was 10,420 acres, and in Cuddapa 5949 acres, total 16,369 acres; and the whole revenue from irrigation amounted to 5763*l.* There is no marked extension from year to year, and the financial prospects of the canal are most unsatisfactory, not nearly paying its working expenses. The rate charged for water, namely, 6 rupees per acre, is considered to be excessive, for ryots are unwilling to go to the expense of converting dry land into wet, when they have to pay so high a charge.

The Karnúl district has an area of 7358 square miles with a population of 959,640, or 130 to the square mile; and Cuddapa covers 8367 square miles with a population of 1,351,194, or 161 to the square mile.

The Tungabhadra, after a course of 213 miles, falls into the Krishna about 81 miles below Karnúl; and soon afterwards the main river approaches the gorges of the Eastern Ghâts. In this part of its course the Krishna receives several small tributaries on its left bank, from that part of the Nizam's territory, which formed the ancient kingdom of Telingana. It is now included in the three zillahs or districts of Nulgunda, Kummum, and Eilgundel, which vie with Mysor and the Carnatic in the number of their tanks. Eilgundel is, however, within the Godavari river basin. A splendid system of tank irrigation was established by the ancient Telugu dynasties, and maintained by their Muhammadan successors. The surface of Telingana is undulating, with numerous hollows and depressions suited for tank basins, and detached granitic hills crop out in all directions. The drainage from summer rains is stored in tanks, of which there are upwards of 2000 in the Nulgunda zillah, and as many in that of Kummum. In many places permanency of supply is maintained by channels drawn from rivers or rivulets on the way to the Krishna. Thus a canal from the Musa, near Haidarabad, fills a series of four tanks, one below the other.

The Krishna and the Pennair, after passing through the Eastern Ghâts, supply water for two important systems of deltaic irrigation. The upper courses of these rivers and their tributaries traverse the wide belt of arid region, with a rainfall of less than 30 inches, which is exposed to periodical visitations of scarcity and famine. If the necessary storage reservoirs were constructed on the streams which command this region, so as to supply water in the years when the usual rains fail, there would be no more famine. It is quite true that, even if all water was intercepted and none was wasted, nothing like the whole calculated rainfall could be relied upon. Sir William Denison had a careful experiment made at Sydney, in New South Wales, which showed that not more than a quarter of the total rainfall, on a given surface of an average character, finds its way to the outfall. Still, after all possible allowances, the existing *data* show that, if no water within the Krishna catchment basin was allowed to run to waste, all danger of a recurrence of famine in that region would be at an end.

Karnúl and Cuddapa are divided from the districts on the east coast by the Eastern Ghâts, the highest peaks of which attain a height of 3000 feet. The slopes are covered with low jungle, in some places mixed with bamboo, and in parts timber of good size is met with. The Krishna passes through this chain, and enters the low country about 60 miles from the sea. Below Bezwara, near the entrance of the gorge, both banks spread out into rich alluvial plains. At Bezwara the River Krishna is 1300 yards wide, and has a depth in the dry season of 5 to 6 feet, in average freshes of 31, and in highest freshes of 38 feet. The flood discharge is 1,188,000 cubic feet per second. The Krishna and Godavari have produced the alluvial plain on this part of the east coast of India, and half-way between them is the Colair Lake, a low swampy tract representing the work which the two rivers have to perform before the alluvial plain can be regarded as perfect.

The English acquired this plain in 1766, and for eighty years they did absolutely nothing, while famine and pestilence periodically desolated the region. In 1833, when the rains failed, not less than 200,000 people died of hunger, the Government lost 900,000*l.* of revenue, and the loss of property amounted to 2,500,000*l.* So that neglect of irrigation works is a most wasteful, as well as a life-destroying policy. By establishing channel heads on the river banks at the apex of the delta, and by securing there such a height of water as the levels of the lands to be irrigated may require, the whole tract below is placed under command, and its productiveness is secured to an extent only limited by the volume of water at command. The Krishna delta works affect an area of 2000 square miles, inhabited by 1,000,000 souls.* The river flows along an elevated central ridge, or backbone, with the country falling off gently towards the right and left, and a general inclination to the sea.

At Bezwara, the Krishna flows between hills, with a width of 1300 yards. The hills furnish an abundant supply of stone for building, and lime is easily procurable. The position is exactly at the apex of the delta, and the height is sufficient for purposes of irrigation. Here the *anicut* has been thrown across the Krishna. The work was begun in 1852. It consists, first, of a broad basis of heavy stones thrown into the river, and allowed to assume its own natural shape, 3750 feet long, 305 feet broad, 21 feet high in front, and 14 feet above the summer level of the water. It is faced with a casing of stone masonry, 75 feet broad, resting on a double row of foundation walls. The sill is 20 feet broad and 5 feet thick, of cut stone, bound together with iron clamps, and 1280 yards long. Under-sluices are provided at the right and left extremities of the dam, for the purpose of scouring out the silt in front of them, and thus keeping an open channel at the heads of the irrigation lines. The total length of each sluice is 132 feet.

On the Masulipatam, or left bank, the main channel from Bezwara breaks into two branches, 900 yards from the head sluices. One runs towards Ellore, 39 miles long, and the other to Masulipatam, 49 miles long. The first branch of the Ellore canal opens at the eighth mile, and is called Ryves's Channel, and a branch, 19 miles long, runs to Gudaveda. Various other channels spread over the delta, in the direction of Masulipatam. On the Guntur, or right bank, the main western channel runs parallel with the river, with two principal branches at right angles, the Vellatur and the Yeskapilli. The Commamur Channel runs south-west, away from the river, and will irrigate 100,000 acres, in a length of 50 miles. The whole length of the principal canals already finished is 254 miles; when completed their total length will be 320 miles. The irrigated area in the delta is 226,226 acres, yielding a revenue of 89,000*l.*

The river Pennair is connected with the Krishna system by the Madras Irrigation Company's canal, and the two rivers may be appropriately treated of together. The Pennair rises in the north of Mysor, describes a curve through the Bellari district, flows through Cuddapa, and falls into the sea about 19 miles below the town of Nellor. Its length is 355 miles, and the area of its catchment basin 20,500 square miles. During the course of ages the Pennair has formed for itself a delta of alluvial soil, peculiarly well adapted for rice crops, in the district of Nellor, the area of which is 8462 square miles, with a population of 1,376,811 souls, or 163 to the square mile. In former times numerous tanks were formed by the natives, to supply water for their crops, and small irregular channels were led off from the river. But in 1855 an *anicut* was constructed across the Pennair at Nellor, in order to secure a good and certain supply of water for all the tanks. In 1857 the flood waters rose to such a height and did such damage that a second dam was built. This also failed, and the present *anicut* designed by Sir Arthur Cotton, was completed in 1863. It is 677 yards long, with the crest 9 feet above the bed of the river. Hitherto it has stood admirably. The Pennair comes down impetuously in bursts of short duration, so that with a precarious river of this kind it is necessary to keep a reserve of water by means of the Nellor and other tanks. Thus the system consists of an *anicut* and a series of tanks, water being given direct from the *anicut* so long as there is water in the river. The supply channels are so adjusted as to discharge into the tanks until they are full, and then to supply the land direct. The irrigated area is only on the left bank, the levels on the northern side being too high.

The water supply under command will irrigate 64,000 acres, the quantity allowed per acre being 2¼ cubic yards per hour; and this will be supplied for 150 days, which is ample time for a rice crop to come to maturity. There are three main channels issuing from the primary feeder, called Jaffer Saib's, Krishnapatam, and Savepalli; under the two first 34,000 acres being cultivated, and under the last 30,000.

There are several more smaller rivers in the Nellor district which can be utilised for irrigation. A large reservoir could be formed near Gandepalem, which would be of immense use to the people, and where a tank existed in former times. Throughout Nellor there are 975 tanks, yielding a revenue of 94,000*l.*, fed by small rivers and streams which rise in the Eastern Ghâts. During the recent famine, one of the suggested relief works was the Sangam project for using the flood water of the Pennair. The head works are at Sangam, near Atmakur, and about 30 miles above the *anicut* at Nellor; and their object is to carry water to tanks and reservoirs for irrigation, by which 94,000 acres would be brought under wet cultivation.

The extension of the irrigation works connected with the Krishna and Pennair, and their tributaries, involves questions which touch the interests of by far the largest part of the arid country recently visited by famine. The complete utilisation of all the water within this area would be the cause of a great and beneficial change in the physical aspect of a vast region. Such a change, by following in the footsteps of the ancient rulers of the land, the Kings of Vijiyanagar and Telingana, it is the obvious duty of the English masters of India to effect.

C. R. M.

INDIAN FAMINES AND SUN-SPOTS.

The Madras Famine of 1877 has not been an unmixed evil. Following so closely in the wake of the scarcity in Bengal in 1874, it has challenged and received the most earnest attention of the English people and press, and Indian administrators have once again been compelled to face the question of the food supply of the people, and to feel that that question is one of supreme importance urgently calling for the most anxious and persistent consideration. We do not mean to imply that the Government of India has been neglecting its duty in this matter; it may well be pardoned if it has failed to solve a problem of such magnitude with the data hitherto in its possession. Every year now, however, the Statistical Department is placing at its disposal more materials for the solution of the problem, and we shall be justified in requiring from the Indian Government which shall have to deal with the next famine in the East, a far stricter account of its stewardship than we could fairly have exacted in the year that is passing. Since the beginning of 1877, the question has assumed an entirely new aspect, and to Dr. W. W. Hunter, the talented and energetic Director-General of Statistics to the Government of India, is due the high credit of pointing out a way of escape from the iron grip of the gaunt demon which periodically devastates portions of our Eastern Empire. Dr. Hunter, our readers need hardly be told, is no new worker in this field. Since the creation by Lord Mayo, in 1869, of the Statistical Department, of which he was appointed chief, he has necessarily been in the front rank in every battle against famine, and has manfully striven to bring the question within the reach of calculation. On the outbreak of the Bengal scarcity of 1874, when the Indian authorities gave way to unreasoning panic and permitted themselves to be terrified by vague threats from England, Dr. Hunter made a careful but sober estimate of the requirements of the case, which the event proved to be absolutely accurate, and which, had it been adopted as the basis of relief measures, would have saved the country an expenditure of something like five millions sterling. His present service in the same cause is even more valuable. Hitherto he has dealt with the question how famine should most efficiently, and at the same time most economically, be treated when it has declared itself, or when its occurrence in the immediate future is apparent and inevitable. The question raised by his most recent researches is the very important one whether we cannot foretell the approach of the calamity in ample time to allow of our providing against the evil day.

---

* In the whole Krishna district the population is 1,452,374, or 181 to the square mile, over an area of 8036 square miles.

While engaged in the end of last year in collecting rainfall statistics at Madras, with reference to the then impending famine, Dr. Hunter was struck by an apparent connection between the amount of the rainfall at that place and the number of sun-spots. Following out with his accustomed energy the inquiry thus suggested, he published in the beginning of this year a paper, in which he showed (1) that the rainfall at Madras follows a regular cycle of eleven years; and (2) that that period coincides in a marked way with the well-known eleven-year cycle of sun-spots, years of minimum solar maculation being likewise years of minimum rainfall. It was natural that this discovery should attract much attention, both as a matter of purely scientific interest, and because of its evident bearing on the important question of Indian famines; and it was much discussed in the scientific newspapers and by the Royal Society. In the meantime, Dr. Hunter has not allowed the matter to rest, and he now, in conjunction with Mr. Norman Lockyer, gives the results of his inquiries in a paper of great interest, published in the *Nineteenth Century* for November. We propose to give our readers a brief *précis* of the writers' argument, and to state the results arrived at in this essay.

After giving an account of some of the principal speculations regarding the constitution of the sun in which philosophers have indulged during the past hundred years, the writers recapitulate what is known regarding the solar phenomena, and the intimate connection between them and the energies at work on our planet. The three classes of solar phenomena with which we are familiar—sun-spots, uprushes of metallic vapour, and prominences—vary regularly and all together in a cycle of eleven years, so that, once in every eleven years, the number of sun-spots and of uprushes and of prominences is greatest, and once in every eleven years the number is at its minimum. Any one of these classes of phenomena may fairly be taken as the representative of the sun's energy, and the comparative number of sun-spots has been selected because, for the last fifty years, a careful enumeration of these has been made by Hofrath Schwabe, of Dessau; and the area covered by the spots has, more recently, been noted with great accuracy by other observers. Taking, then, sun-spot frequency as the index of solar activity, the question which Dr. Hunter and Mr. N. Lockyer propose to themselves in this paper is—whether the cycles of solar activity coincide with any well-marked cycles in the atmospheric or other conditions of the earth? On *à priori* grounds there is reason to suspect the existence of such a common cycle of terrestrial and solar phenomena; but the writers arrive at their conclusions, quite independently of *à priori* considerations, by adducing a number of facts and results arrived at by independent and isolated observers in every part of the world. They have directed their attention specially to four different classes of terrestrial phenomena, viz. (1) periodical variations in terrestrial magnetism and electrical activity; (2) periodical variations in temperature; (3) periodicity of wind-disturbances, hurricanes, and cyclones; and (4) periodicity in tropical rainfall. Written, as it is, with special reference to the question of Indian famines, the paper deals more specially with the rainfall cycle; but our readers will, we are sure, readily forgive us if, before proceeding to give an account of the part of the paper which refers to that subject, we very briefly state the results arrived at with respect to the first three classes of phenomena. These results are of great interest, not only as giving an idea of the extent of the field already covered in connection with the inquiry, but also, as we shall see, on practical grounds.

As regards the first class of phenomena, then, it is shown from a review and analysis of the mass of evidence contained in the observations of Gauss and Arago and Sabine, of Lamont, Wolf, and Gautier, Loomis, Tromholdt, Schiaparelli, Broun, and Balfour Stewart, that magnetic variations, irregular as well as regular (diurnal), follow a constant cycle of eleven years, and that this cycle coincides closely with the eleven-year sun-spot period. Further, it is not less evident that, to quote the words of Mr. C. V. Walker, Superintendent of Telegraphs, "earth-currents, disturbed magnetometers and auroræ are parts of the same phenomenon," and are all intimately connected with the relative number of spots on the sun's surface. The importance of this deduction, as affecting the practical working of telegraphs, is evident.

Proceeding to the second class of phenomena, a large amount of evidence is again adduced to show that a periodicity exists in solar radiation and thermometric variations, and that that periodicity coincides with the sun-spot cycle. The inquiry in this direction is complicated by such physical considerations as the constitution of the atmosphere of the earth and the various molecular conditions in which the vapour of water may exist; and the evidence is consequently, as might be expected, not altogether so satisfactory as in the case of magnetic phenomena. Nevertheless, some of the results obtained, and especially those arrived at by Dr. Köppen, are so striking that it is impossible not to believe that an intimate connection exists between thermometric phenomena and the sun-spot cycle.

With respect to the third class of phenomena, the evidence is much more convincing. The relation between sun-spot frequency and wind-disturbances has for some years been the subject of careful inquiry by Dr. Meldrum, Government Astronomer at Mauritius, who has dealt with the cyclones of the Indian Ocean, and by M. Poëy, who has, in like manner, studied the hurricanes of the West Indies. Five years ago, Dr. Meldrum established the coincidence between frequency of sun-spots and of cyclones, and the results of M. Pöey's researches are strongly corroborative of the existence of a cycle of wind-disturbances coincident with the eleven-year sun-spot cycle. Many of our readers, no doubt, noticed the account in the *Times* of the extremely interesting and valuable application of this discovery by Mr. Henry Jeula, Secretary to the late Statistical Committee of Lloyd's, who, conjointly with Dr. W. W. Hunter, endeavoured a few months ago to ascertain whether the periodicity in tropical wind-disturbances produced any well-marked effects on the shipping of the world. Tabulating the information obtained from Lloyd's Loss-Book for the two periods of eleven years since 1855, they found that "the marine casualties disclosed a cycle closely corresponding with the sun-spot period. The percentage of casualties on the registered vessels of the United Kingdom was 17½ per cent. greater during the maximum two years in the common cycle than during the minimum two years;" and that "the percentage of losses on the total, posted on Lloyd's Loss-Book during the eleven years, was 15 per cent. greater during the two maximum years of the common cycle than during the two minimum ones."

But it is necessary that we should hasten to give some account of the part of the essay which relates to the connection existing between tropical rainfall and famine, and the cycle of sun-spots. In dealing with this part of the subject, Dr. Hunter confines his remarks almost exclusively to Madras and Bombay, these being the stations for which returns are available for the longest periods, and at which the effects of the two great Indian monsoons are most clearly marked and can be best studied. The average annual rainfall at Madras is made up of 29 inches brought by the north-eastern monsoon (October to December); 17 inches brought by the south-western monsoon (May to September); and 2½ inches which fall between the monsoons—total, 48½ inches. Any considerable deficiency during either of these periods—or a partial failure of both the monsoons—results in famine. There are thus, for the purposes of such an enquiry as this, three elements of comparison, namely—(1) the total rainfall of the year; (2) the average supply brought by the north-eastern; and (3) the average brought by the south-western monsoon. Dr. Hunter examines each of these separately, with the following results. Firstly, whereas the average annual rainfall at Madras is 48½ inches, the average quantity which has fallen in years of minimum sun-spots, since the introduction of rain gauges, has been 34½ inches, or 29 per cent. less than in ordinary years. In the second place, the average rainfall brought by the north-east monsoon in years of minimum sun-spots has been only 17 inches, against the ordinary average of 29 inches, that is to say, this monsoon has brought 41 per cent. less rain in years of minimum solar maculation than in ordinary years. And, thirdly, in like manner, the south-western monsoon at Madras has proved distinctly deficient in every year of minimum sun-spots since the introduction of rain-gauges, in 1813. Moreover, this deficiency has not been confined to the actual years during which the sun-spots have been fewest. Including the years immediately preceding those of minimum maculation, we find that the north-east monsoon (the principal factor, as our readers will have noticed, in the Madras rainfall) brought 25·75 per cent. less rainfall than the average, and the south-west monsoon, 20·75 per cent. less than its average supply in these pairs of years. And the cycle is tested in yet another way. If, argues Dr. Hunter, there is a true coincidence, it should disclose a well-marked minimum group, at the extremities of the cycle (in the eleventh, first, and second years), and a well-marked maximum group in the middle of the cycle (the fifth, sixth, seventh, and eighth years). The years on both sides of the central maximum group (that is, the third, fourth, ninth, and tenth years) should yield intermediate results, and when taken together should form a well-marked intermediate group. On subjecting his figures to this test, the coincidence remains distinctly marked.

In like manner it is shown that the average rainfall in ordinary years at Bombay is 18 per cent. greater than the average in years of minimum solar maculation; and a similar result is arrived at by an analysis of the rainfall returns of the Cape of Good Hope.

We have said enough to show clearly the drift of this most interesting paper. The results arrived at by the authors may best be summarised in their own words: "We find," they write, "that as regards sun-spots and terrestrial magnetism a common cycle of eleven years is now an established fact; that there are indications (although not proofs) of an eleven years' cycle in solar radiation and mean temperature; that there is ample evidence of such a cycle in wind-disturbances; and absolute proof of a cycle of eleven years in the great factors of tropical rainfall. We further find that the eleven years' cycle in the separate classes of terrestrial phenomena correspond with the eleven years' cycle of sun-spots; and that with regard to the three sets of terrestrial phenomena on which we possess fullest evidence (magnetism, wind-disturbances, and rainfall), the correspondence is most clearly established."

The bearing of the law, as regards tropical rainfall, on the question of famine is evident. Deficient rainfall in India means total or partial failure of the crops, and the result is starvation or terrible distress. Five of the six famines which have occurred in Madras during the period of sixty-four years over which these researches extend, have fallen within the three-years group of minimum rainfall and sun-spots, and the sixth spread over two years within the group and the year immediately preceding it. It is clear, then, that if we can (and within certain limits we undoubtedly can) predict groups of years of minimum solar maculation, we are forewarned of at least the probability of famine in those groups of years. Further than this Dr. Hunter will not at present go. He does not consider the data at our disposal sufficient to justify prophecy. But it is evident that the whole question of the treatment of Indian famines has, by this discovery, entered upon a new phase—that we must make the years of plenty provide for the years of dearth. And no Indian Governor who, with this warning before him, fails to provide against the evil day, will henceforth be held guiltless.

This paper in the *Nineteenth Century* is as suggestive as it is lucid and logical, but it is not our province here to follow the train of thought which it suggests, There is much that is sad in our position in India, and there is something specially pathetic in the reflection that the same sun which has so often made the thirsty earth crack and gape, and has shone with fierce and ghastly brightness on the bleached bones of the victims of famine, has, through all these years that we have been in India, borne on its face the warning words which we are only now learning to read.

WATER-PARTINGS *versus* RANGES.

Mr. Trelawney Saunders, in the July (1877) number of the *Geographical Magazine*, has expressed his dissent from my statements regarding the Karakoram. While taking what I venture to consider very broad and correct views of Himalayan orography in general, he leaves, I think, room for discussion on this point. His treatment suggests the questions: Are the words *range and water-parting* convertible terms? Is every water-parting necessarily a range? The importance of accurate terminology in the description of mountain scenery by travellers and geographers is so great, as to justify, at least, a short discussion of what seems a crucial case.

I think, that, in a general way, it will be agreed that the words range and water-parting are not identical in meaning. The term range of mountains has reference to physical features, and implies something marked as regards extension, profile, elevation, &c. The word water-parting denotes merely a *function*, that of dividing the heads of streams which flow different ways. Nature might have been so constituted that the heads of streams were never parted except by a range of mountains. But it is not so. A pile of mud in a roadway may be a water-parting.

The particular point at issue between Mr. Saunders and myself may be thus stated:—"Is the water-parting between the Lob (Eastern Turkistan) basin, and the Indus basin, throughout formed by a range of mountains or no?"

According to Mr. Saunders's system we have here a portion of the Tibetan Plateau, bounded by two mountain chains, of which the northern chain is the Kuenlun, and the southern "which divides the Lob basin from the Indus basin . . . . is conveniently distinguished as the Karakoram Range." Of course this implies, and Mr. Saunders states, that the plateau itself forms a part of the Lob or northern basin, "the chains are here only separated by the upper valleys of the streams which water the plains of Yarkand, &c."

I will now give "the limited conceptions of the observer on the spot." Leaving out of consideration the extreme western part, I divide the Lob-Indus water-parting into two sections. *(See diagram.)* Regarding the first, or westerly section, Mr. Saunders and I are agreed. It is a mighty, snowy range, appropriately called the *Muztak*. The second section commences from the head of the Nubra Valley. It is about this that we disagree. Here we get to Mr. Saunders's Tibetan Plateau. As Mr. Saunders says, the head-waters of the Yarkand and Khotan streams rise on this plateau, and they flow off it through and round the Kuenlun Range (its northern bounding range); but if you go south from the heads of these streams, you find yourself still on the plateau, with other streams rising on it, and flowing off southward, into the Shayok River (an Indus feeder), through narrow gorges, formed in a mighty chain of snow mountains, which is a continuation in direction, and in every other characteristic, of the Muztak Range. This chain, which I will call the Eastern Muztak, forms the southern boundary of the plateau.[*]

Now, Mr. Saunders ignores this great mountain range, and because he justly considers that the plateau has a southern bounding range, he carries this round the heads of the streams which run off the plateau to the southward, and therefore places the southern bounding range to the north of a considerable portion of the plateau. It is the more strange that he should ignore the real southern bounding range, and insist that the range must be where he sees on a map the sources of the streams, because, in another part of the same article he justly reprobates as heretical the assumption that "a succession of peaks in the same direction do not constitute a chain if *rivers rising on one side* passed between the peaks *to find their outfall*

---

[*] The following is the description given by a recent traveller *from the South.* Ascending on to the plateau through one of the gorges just described, from the Shayok River, he writes:—"At the top of the ascent a strange sight met our view, for we found ourselves on an immense undulating plain—the Depsang—which looked like the top of the world. . . . . Northwards, in front of us, we saw a few irregular, flat-topped hillocks—they looked like—scattered about. . . . . I had occasion to look back in the direction of the route by which we had come. A fine snowy range of mountains met my view, and looked quite continuous, but, of course, this was a deceptive appearance, as we had passed through this apparent chain without crossing any pass. . . . . These limestone mountains and peaks are, probably, as Mr. Shaw says, the continuation of the Mustagh Range; but where is the Karakoram Range? The only thing seen from the vantage ground of Depsang (17,817 feet above sea-level) that *looked* like a range we had passed through and left behind us, while the Karakoram *Pass* was distant about 25 miles (to the north-west, among the seeming hillocks)."—Dr. Scully's "Contributions to the Ornithology of Eastern Turkistan," in vol. iv. of *Stray Feathers.* (Calcutta, 1876).

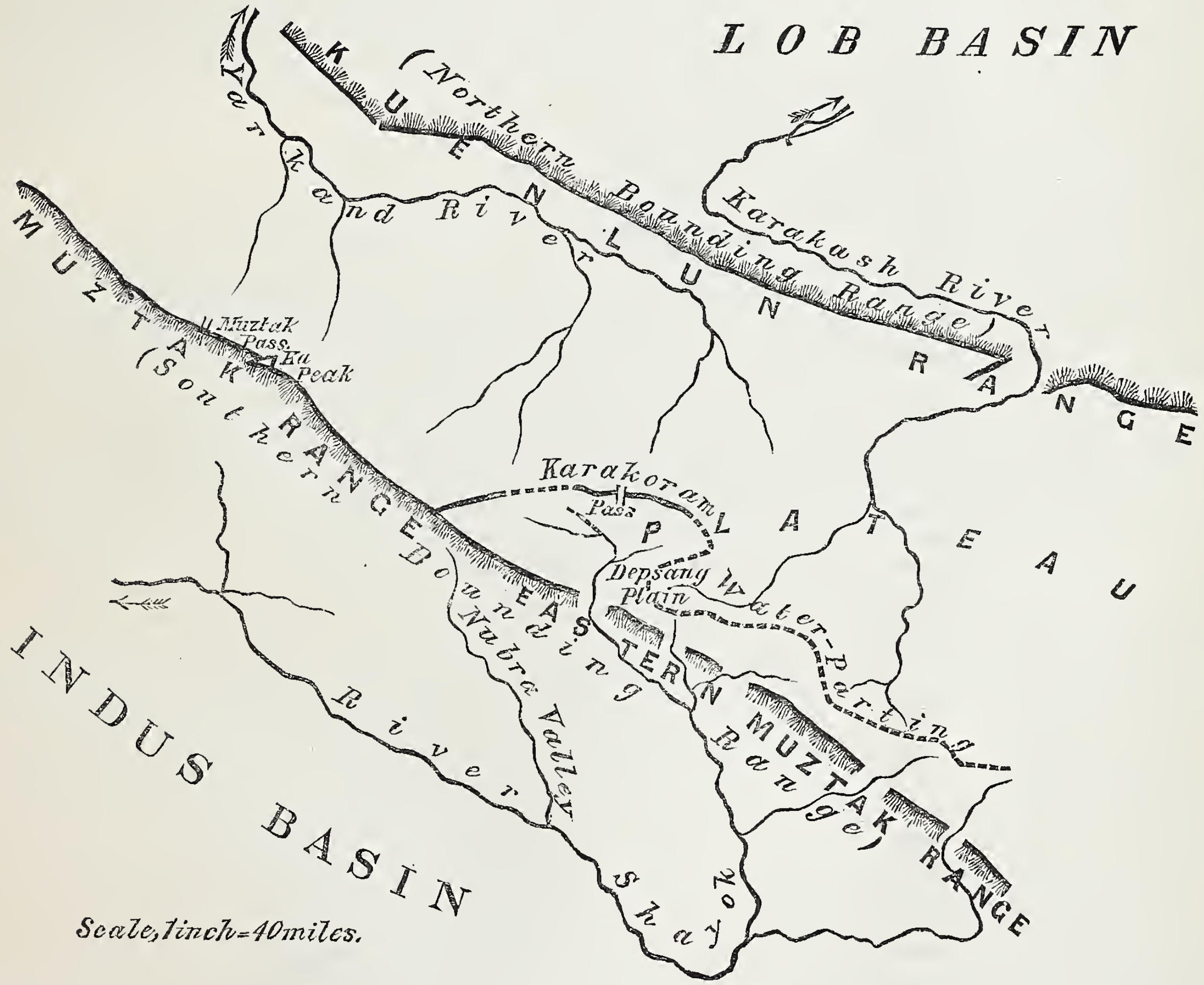
I had previously drawn Dr. Scully's attention to the question, and asked him to observe the facts, so as to be able to form an independent opinion.

Dr. Thomson, the first English traveller who visited the Karakoram, writes in a similar way regarding the great range which bounds the Depsang on the south.

The Depsang Plain itself, although to the south of Karakoram, is believed to drain, by its north-east corner, into the Karakash (in the basin of Lake Lob).

on the other." This is precisely the case with the Eastern Muztak. We might as well ignore the *northern* bounding range (the Kuenlun) because it is penetrated by the streams from the plateau, and talk of the central water-parting (the Karakoram) as being the *northern* escarpment of the plateau. The difference is only in degree, for a greater portion of the plateau lies on the north than on the south of the Karakoram water-parting.

It is as if we had a broad terrace, supported by a wall on the north and a wall on the south. Because these walls have got into bad repair, and the rain water, falling on the surface of the terrace, forms there little runlets, which trickle out in places, through cracks in the masonry, we have no right to say that this no longer forms a wall, and to describe the supporting wall as running along the middle of the terrace, behind the heads of the little streamlets.



I therefore hold that, from the head of the Nubra Valley, the *water-parting*, which has hitherto coincided with the (Muztak) *range*—begins to be divorced from it, the latter continuing in a straight line across the head of the Shayok River and of some of its feeders, which penetrate through gorges from behind the range; while the former (the water-parting), of course, runs round the heads of these streams, across the plateau. It is in this portion of the water-parting that the Karakoram Pass is situated; and to this parting Mr. Saunders would assign the title of a range; indeed, he makes it such a principal feature of his southern bounding range as to carry its name westward, on to the Muztak section, which is really a range.

If we now inquire why this water-parting should be called a range we obtain the following answer from Mr. Saunders: "If any mountains are entitled to the name of range it is the Karakoram, for the following reasons; (1) Its culminating summit attains a height of 28,278 feet in the peak labelled K 2." But it is obvious to remark that this peak is situated in the undisputed section, viz., in the Muztak Range to the west, overhanging the Muztak Pass. This, of course proves nothing about the Karakoram section. Mr. Saunders continues: "(2) It forms an unbroken water-parting between the important drainage of Lake Lob and the Indus." But as nobody disputes its being a water-parting, and the only question is whether it is also a range, this proves nothing; unless we argue that every water-parting is necessarily a range.

Mr. Saunders again continues: "(3) Its length exceeds 300 miles; and whether we regard its height, its length, its water-parting, its passes, its bold and massive character, its extraordinary glaciers, or its deep gorges, it is certainly one of the most remarkable ranges in the world. The lamented traveller, G. W. Hayward, argues with us."

Here we have again a confusion between those sections of the water-parting, which are indisputably a range, and those which are under discussion. My poor friend Hayward's authority will avail nothing here, for he never saw the Karakoram. Mere *length* would certainly not make that a range, which was not so otherwise. The *height* (unless we are talking of the absolute elevation of the whole region above sea-level) has been shown to belong to the Muztak Range. The *water-parting* proves nothing regarding its being also a range or not. A *bold* and *massive* character, extraordinary *glaciers*, and deep *gorges*, all belong in no degree to it, but to the Muztak Range, east and west. Nothing could be less bold or massive than the eminences on the surface of the great plateau, over which the Karakoram Pass leads. This at least can be tested by the "limited vision of the observer on the spot."[*] There is no boldness on the Karakoram, neither are there any glaciers or gorges. A man would find the greatest difficulty in breaking his neck anywhere nearer to the Karakoram than the Eastern Muztak Range. In other parts of the water-parting I have walked across, in an open plain (very elevated, of course, but) far away from any mountains, from the heads of streams flowing towards Lake Lob into the heads of others which feed the Indus.

It may safely be said that this line of water-parting, which in places is an open plain, and in places a ridge of low profile (see last note), would never have been called a great range had it not happened to divide two important basins. But I would urge that this is a confusion of ideas. The *importance* of a water-parting does not make it into a range if it is not one otherwise. The essence of a range stands in its *shape*; that of a water-parting in its *function*. Every range is a water-parting (more or less important and continuous). But every water-parting is not a range. A hillock or a flat expanse of sand do not rise into the dignity of a range, because they chance to separate two important drainage basins. An ox which is ridden by a king does not become a horse.

Nor is it necessary to Mr. Saunders's main argument to convert the Karakoram into a range. His system of a plateau, bounded by two mountain chains, north and south (the Kuenlun and the Muztak according to my nomenclature) would be quite correct if he would admit that the water-parting between the Lob and the Indus basins occurs on the plateau (and does not coincide with either of the ranges until further west), and that both the bounding ranges are cut through by the streams from the plateau (as he already admits that the northern range is cut).

My protest (in which I should have expected Mr. Saunders's support) is raised against the practice of tracing out on the map a line dividing the head-waters of the streams belonging to separate basins, and then assuming that along that line, and there only, runs a range.

Finally, I may note in passing, it is strange that the western portion of Mr. Saunders's "Tibetan Plateau" excludes the greater part of the table-lands of Western Tibet, viz. Zanskar, half Ladàk, Rupshu, Gugé, &c.

Robert B. Shaw.

Simla, *Oct.* 4, 1877.

THE ARCTIC FÖHN.

I observe a highly-important article on "The Greenland Föhn" in the *Geographical Magazine* for September, by Captain Hoffmeyer, Director of the Meteorological Institute, Copenhagen, wherein reference is made to a rise in temperature experienced on the west coast of Greenland between the 23rd November and the 11th December 1875. As the weather at Discovery Bay, latitude 81° 44′ N., and at Floeberg Beach, latitude 82° 27′ N., nearly 1300 miles north of Ivigtut, the most southerly station noticed, was similarly disturbed at about the same period, the following notice may be of interest.

The winter quarters at Discovery Bay were protected from the S.E., through N.E., to West, by precipitous hills attaining an altitude of upwards of 2000 feet. Two miles towards the S.W. an island, 2050 feet high, protected the ship from that direction. Only S.E. or W. winds could reach the station direct. Consequently the records of the winds are merely of those at the locality, and do not denote the winds prevailing in the neighbourhood.

"Floeberg Beach" was protected from S.S.E., through S.W., to N.N.W., by hills 500 feet high, sloping gradually up to an altitude of 1000 feet, at 10 miles distance towards the S.W.

The average temperature at each station due to the season should be from —20° to —27°. From noon of the 26th of November until 8 p.m. of the 13th December, except for a few hours on the 9th, the temperature remained above this average. From the 2nd to the 7th of November, southerly winds, accompanied with a low barometer, raised the temperature at both positions above the average. On the 8th a northerly wind, which did not reach the station at Discovery Bay, set in at Floeberg Beach; the temperature at both stations falling below zero, with a rising barometer.

The barometer continued to rise until the 12th, when it attained its highest level recorded during the year, the reading corrected being, Discovery Bay at noon, 30·877 inches; Floeberg Beach, at 5 and 6 a.m.,

---

[*] Dr. Scully writes: "We ascended a few hundred yards to a small commissure of loose detritus connecting two low hills, and found ourselves on the Karakoram Pass. . . . . The descent on the north side was even less than the ascent had been, and altogether the Karakoram Pass reminded one much more of a short embankment 300 feet or so above the level of the surrounding country, than of what one understands by a 'Mountain Pass.'"

Nor is it the case merely that the "summit of the Karakoram is in part flattened," as Mr. Saunders says. This is quite the boldest part of the water-parting, if we consider it in its length. While, if we take a cross-section drawn to scale, and taking the lowest points between the Karakoram and the ranges north and south of it respectively, as representing the level of the surrounding country; separating these points (which are really 45 miles apart) by a space of six inches on the paper, the height of the Karakoram above the straight line which joins them would be rather less than one-twentieth of an inch, on the same scale, and that of the highest point on the line of the water-parting not so much as twice that. This is the boldest part of the Karakoram water-parting.

30·821 inches. The weather was calm, with light variable airs: temperature about the average.

On the 21st, with light northerly winds, the temperature at each station fell considerably, the mean on the 22nd being —40° at Discovery Bay, and —41° at Floeberg Beach.

On the 23rd and 24th light northerly winds kept the temperature low, with an average barometer rising slightly.

At 9 A.M. of the 26th, at Floeberg Beach, a light air from the West backed round to S.S.W., and afterwards to S.S.E., with a quickly-rising temperature and slowly-falling barometer. The wind lasted fifteen hours, varying from calms to squalls. At 9 P.M. the temperature had risen to +19°.

During this period the 'Discovery,' in her protected position, experienced calm and cold weather; only one light puff from the S.E. reaching her at noon, the highest temperature being —10°. We must, therefore, conclude that the warm blast which reached Floeberg Beach passed clear of Discovery Bay in its passage north.

At Floeberg Beach the disturbance lasted until 1 A.M. of the 27th, when it was checked by a squall from the west, which instantly lowered the temperature to —10°, about the same temperature as the 'Discovery' experienced at the same time.

During the four following days the 'Alert' experienced variable light airs from the N.W., with a high temperature, from —13° to —7°, a most unusual occurrence.

At Discovery Bay, although the four hourly readings recorded a similar temperature, the maximum thermometer recorded +1°·6 at midnight of the 28th, and +5° on the 30th. These blasts of warm air did not reach Floeberg Beach.

The barometer rose steadily from midnight of the 26th until midnight of the 28th, falling on the 29th, and remained steady at 30 inches on the 30th. On the 1st December a southerly wind was blowing at both stations, with occasional light squalls from an opposite direction, temperature —5° to —10°; but the maximum thermometer, read at noon of the 2nd, registered +3°·2 at Floeberg Beach. That at Discovery Bay, at midnight of the 1st, registered zero; and on the 2nd, +3°. At 8 P.M. on the 2nd, another south-easterly wind, accompanied with a falling barometer, reached Floeberg Beach. At 4 A.M. of the 3rd, the temperature rose above zero; at 7.30 A.M. a squall from the S.E. raised the temperature to +25°; at noon the maximum thermometer registered +34°, and at 8 P.M. +35°. At 10 P.M. a sudden shift of wind to the northward lowered the temperature immediately, and at midnight it was down to +4°.

This very warm blast passed the latitude of Discovery Bay without affecting the temperature there, the maximum temperature registered being +4° only. Light north-westerly winds and calm were experienced.

At 5 A.M. of the 4th, another southerly squall, lasting two hours, reached Floeberg Beach, raising the temperature from +2° up to +23°. At 8 A.M. a breeze from the N.N.W. caused it to fall below zero again

This last wind forced its way into Discovery Bay, and affected the temperature there to an equal degree, but not at quite so early a period in the day. At 1 A.M., a gale set in from the S.W.; at 5 A.M. the temperature was +2°, wind variable; at 9 A.M., +16°; at 11 A.M., +21°; and about noon, when the cold air current had replaced the warm blast at Floeberg Beach, the 'Discovery' registered a temperature of +26°, with a S.E. wind the temperature then gradually fell, with a N.E. wind; at 8 P.M. it was below zero, and by noon of the 5th it was calm, with a temperature of — 20°.

At both stations the barometer rose slightly for 29·70 inches during the 3rd and 4th to about 30 inches. At 8 P.M. of the latter day it commenced to rise rapidly, with a falling thermometer.

At 8 A.M. of the 6th, when it was calm at Discovery Bay, temperature — 11°·6, the 'Alert' experienced a S.S.E. wind, which raised the temperature to — 2° A succeeding northerly air lowered it to — 12° the same temperature as at Discovery Bay, which station the warm blast passed without affecting.

At 3 A.M. of the 7th, during calm weather the temperature at Floeberg Beach again rose above zero, and remained above for twelve hours, the maximum temperature being +4°·8. A similar rise in temperature occurred at Discovery Bay, a few hours later, but then a squall from the S.E., which did not reach Floeberg Beach, was felt at noon. The temperature remained high at both stations until the afternoon of the 9th, when it fell below — 20°, the fall occurring earliest at the most northern station.

Between the morning of the 10th and evening of the 13th, each station experienced variable light airs and calms, with a low barometer, reaching 28°·979 at Floeberg Beach, and 28°·995 at Discovery Bay, the lowest reading recorded during the year, the temperature rising to — 7° at the first station and — 5° at the latter.

By midnight of the 14th, although the barometer remained low, the disturbance had passed away at both stations, the temperature ranging between — 20° and — 40° during the following fortnight. An unusual quantity of snow fell on the 6th, 7th, and 8th December.

It would appear that the disturbance that caused the rise in temperature, producing a heat excess of 46° at Upernivik on the evening of the 25th November, arrived at Discovery Bay and at Floeberg Beach about twenty-four hours afterwards, producing a heat excess at the northern station of about 40°.

On the 3rd December there was a heat excess of about 58° at Floeberg Beach; and on the morning of the 4th, at both stations, a heat excess of about 46° or 48°. In my journal of the latter date I find recorded: "This last gale undoubtedly travelled to the northward from Baffins Bay, perhaps from the Atlantic. The warm air is at a higher temperature than any water within some 600 miles of our position."

On the 13th I wrote:—"Any force that could put in motion so vast a body of air as must be necessary to affect our temperature of 50° of Fahrenheit, raising it from — 20° to + 35°, and to keep it above the average for eighteen days, between the 25th November and the 13th of December, must have been very considerable, and I cannot but expect that very severe weather must have occurred even as far south as Cape Farewell."

G. S. Nares.

MR. STANLEY'S VOYAGE DOWN THE CONGO.

LETTERS from Mr. Stanley were published in the *Daily Telegraph* on November 12th and 22nd, in which he gives particulars of his voyage down the Congo from Nyangwe to the Yellala Falls. He thus discovered the unknown portion of its course.

In our numbers for December 1872 (p. 274) and July 1875 (p. 224) we gave some account of the discovery of the mouth of the Congo by Diogo Cam in 1484, of its exploration by subsequent Portuguese expeditions as far as the Falls, and of the enterprise led by Captain Tuckey in 1816. On the 9th of September 1816, after having marched round the Falls, Tuckey reached his furthest point on the Upper Congo, upwards of 200 miles from the sea. He ascertained that the great river was flowing from a north-east direction, and the flood indicated that it came from the tropical region north of the equator. The work before Mr. Stanley was to complete the discovery of the Congo from Nyangwe, the point reached by Livingstone and Cameron, to the furthest point attained by Captain Tuckey above the Yellala Falls. The distance between the two points is about 700 miles.

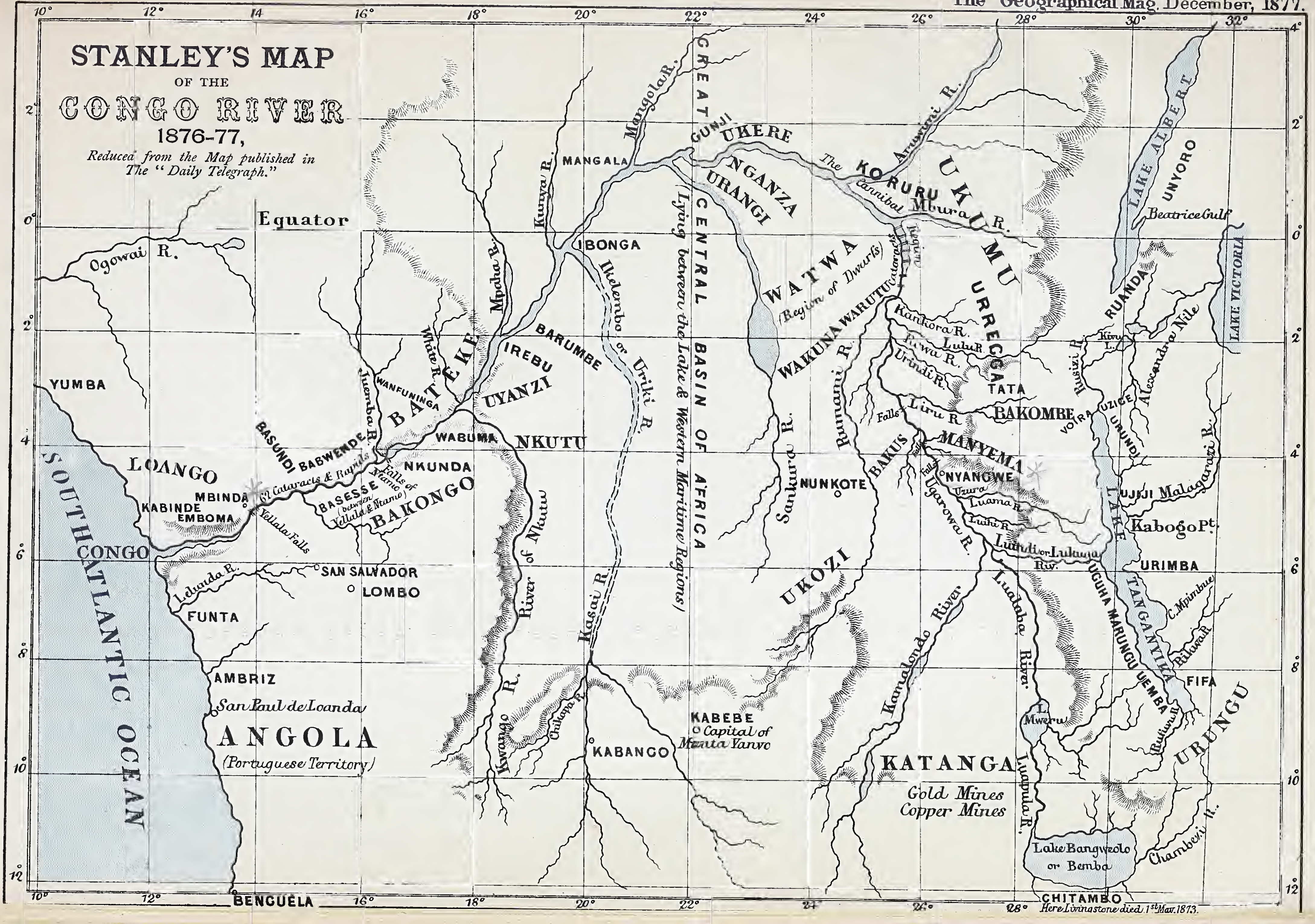
Mr. Stanley left Nyangwe on November 5th, 1876, taking with him an Arab escort, as well as his own Zanzibar men. He at first marched by land, but returned to the river at a point 41 miles north of Nyangwe, in latitude 3° 35′ 17″ S. Here the boat, 'Lady Alice,' was put together, and launched on the Lualaba for the first time. After leaving Nyangwe, the Congo flows northwards as far as the equator, along the skirts of the Ullegga Mountains, which here separate the basins of the Congo and the Nile. Along the river banks, on both sides, dwell fishermen, called Wagenya, who are described as a cowardly and crafty tribe. In this part of its course the Congo receives the Liru, Urindi, Rowa, and Kankora, on the right bank; and the Riuki, Kasuku, and Lomamé, on the left, besides scores of minor streams. At the mouth of the Riuki, a formidable attack from the natives, in canoes, was repulsed, and two days afterwards, the Falls of Ukassa were reached.

On the 6th of December the explorers reached Usongora Meno, and, proceeding down the river, at a place called Vinya Njara, 125 miles north of Nyangwe, another attack was made upon them, and, to add to their difficulties, as many as seventy-two were down with smallpox. Mr. Stanley seized upon the native town of Vinya Njara to house the sick and wounded, and for two days and nights he and his party repelled fierce attacks from the savages. The whole country was roused against the strangers. Here the Arab escort, after accompanying the party for 125 miles, set out on their return to Nyangwe on December 28th. Stanley's party then consisted of 146 souls. On January 4th, 1877, they came to a series of cataracts below the junction of the Lomamé, called the Baswa Falls, in latitude 0° 32′ 36″ S. They are caused by spurs from the Ullegga Mountains. It was necessary to make roads through the forest, and to drag the canoes round the falls, exposed to incessant attacks from the natives. By the 27th of January they had passed 42 miles by six falls, and had dragged the canoes for 13 miles by land, over roads which they had cut through the dense forest. The last fall is in 0° 14′ 52″ S. The river then gradually widened from 2000 yards to several miles, and began to receive grander affluents. They had reached the great basin lying between the maritime and lake regions. Here the Congo receives the Aruwimi, a great river on the right bank, which Mr. Stanley conjectures to be the Uellé of Schweinfurth. On this part of the voyage the cannibal tribes begin, and intercourse became very precarious. Near the confluence of the Aruwimi the explorers were attacked by fifty-four canoes of great size. One had forty paddlers on a side, with paddles 8 feet long, spear-headed and pointed with iron blades for close quarters, the top of each paddle shaft being adorned with an ivory ball. The chiefs pranced up and down a planking that ran from stem to stern, and on a platform near the bow were ten warriors swaying their spears ready to throw. In the fifty-four canoes there were about 2000 savages. Of course their weapons had no chance against breech-loaders, and they were driven on shore, and chased to their villages, where an immense quantity of ivory was found, used for various purposes. Stanley only lost one man in this encounter.

After this the explorers went down mid-stream, avoiding collisions by keeping among the labyrinth of islands. Thus they glided down the river for five days, when want of provisions obliged them to touch at a village, where the natives were friendly, in 1° 40′ N. and 23° E. The chief informed Stanley that the name of the river was the Congo.

On the 14th of February 1877 they lost the island channels, and were carried by the current towards the right bank, in the country of the fierce and powerful Mangala tribe, armed with muskets. Here there was another battle, but again the old muskets, loaded with slugs, were no match for Stanley's breech-loaders, though the battle lasted from noon to near sunset, the canoes all the time drifting down stream. After this the explorers once more succeeded in passing through island channels for four days, unseen by the natives, the river being 5 to 10 miles wide. This brought them to a very friendly tribe at a place called Ikengo. Near here a great river, called the Sankorra, is marked on the map as entering the Congo on the left bank, the same water or lake of which Cameron received information. Next they came to the Kassai, which at its mouth seemed to be nearly as important as the main river. The waters do not commingle for 130 miles, when the Kassai gives the previously clear waters of the Congo a light brown tint. Stanley next came to the mouth of the Kwango, which he describes as a deep stream, 500 yards wide, entering through a line of hills. Six miles below the Kwango confluence, the party was again attacked, and this was the thirty-second and last fight from leaving Nyangwe. They were collecting fuel to make a fire, when several shots from the bush wounded six of them. A regular skirmish followed, which ended in a drawn battle. The main stream now becomes of enormous breadth. But, on reaching the falls, the Congo becomes straightened by banks of naked cliffs, or steep slopes, fringed with tall woods, and piles of naked, craggy rock; and then the waters swept impetuously down in serpentine curves, heaving upward in long lines of

The Geographical Mag. December, 1877.



STANLEY'S MAP OF THE CONGO RIVER 1876-77,

Reduced from the Map published in The "Daily Telegraph."

broad billows. The line of rapids occupies a distance of 180 miles, thundering down steep after steep, in a succession of 62 cataracts. Mr. Stanley gives the fall at 585 feet. It took the party five months to pass these cataracts. Here the gallant young Englishman, Frank Pocock, lost his life, as well as fifteen of the men, and Stanley then hauled his boat and canoes on the shore, above the cataract of Isangila. From the rapids the discoveries of Captain Tuckey, in 1816, commence.

We regret that Mr. Stanley should have gone out of his way to assail the memory of Captain Tuckey, especially as his statements respecting Tuckey's map are incorrect. He says that Captain Tuckey "placed on his map, east of Yellala, about E. long., 16° a cataract at a very wide interval from Yellala Falls, with names of places overland as if he had quitted Yellala Falls and proceeded overland as far as the Kwango river." Captain Tuckey did nothing of the kind. The most easterly rapids on his map are west of Covinda, in about 14° 45′ E. longitude; he expressly says that he never got further east than Soondy N'Sanga in about 15° 10′ E.; and he puts no names of places overland to the Kwango river. There is nothing in Captain Tuckey's map and narrative to mislead any one; and the only way to account for Mr. Stanley's extraordinary statement is that he was provided with some incorrect manuscript compilation, and that he had never seen Tuckey's map. Captain Tuckey was a good surveyor and a most accurate and careful observer. The imputations against him are entirely unfounded; and it is the duty of geographers to defend from unjust aspersion the memory of a gallant explorer who died, from exhaustion and illness, in the faithful discharge of a perilous service.

Sir Roderick Murchison, whose forecasts were seldom wrong, inclined to the opinion that the Lualaba of Livingstone was the Congo. We fully discussed the question, arriving at the same conclusion, in our number for September 1872, p. 174. Subsequently, Dr. Behm advocated the same view. Mr. Stanley by descending the river, has established the fact beyond further dispute. The distance from Nyangwe to the mouth of the Congo, following the course of the river, is calculated at 1800 miles. The highest rise of the river was from the 8th to the 22nd of May. The depth of the rise in the broad parts was about 12 feet, and in the narrows from 20 to 50 feet. Ivory is described as being very abundant, and there are extensive groves of oil palms.

Mr. Stanley was navigating the Congo for nine months, from the 5th of November 1876 to the 11th of August 1877. The difficulties which were encountered and overcome were extraordinary. Dangers in every form were met with intrepid resolution. Marvellous resource and ingenuity were exercised in combating the great physical obstacles, still more in resisting the incessant attacks of the savages. The achievement thus done was of the highest geographical importance, and places Mr. Stanley in the first rank among African discoverers. Captain Purvis, of H.M.S. 'Danae,' placed H.M.S. 'Industry' at the explorer's disposal when he arrived at Loanda, and he and his African followers arrived in her at Simons Bay on the 22nd of last October, proceeding thence to Zanzibar, on the 6th of November.

A DESCRIPTION OF THE ISLAND OF FORMOSA.

With some Remarks on its Past History, its Present Condition, and its Future Prospects.

(Continued from page 296 of our last number.)

The present condition and future prospects of Formosa furnish a topic of great interest. From early days the stories of its riches have attracted many emigrants, and the flat portion of the country is now thickly populated. The cultivation of rice may be said to be perfect. The systems of irrigation are not the result of individual exertions, where each man works for himself, but are clearly the work of large bodies of the inhabitants working for the common good, probably at the instigation of the local Government, and certainly under the direction of good masters. Under the stimulating effect of foreign connections, the trade of the island, by no means despicable to begin with, has been more than doubled in ten years. Not only have old industries flourished, but new ones—pre-eminently tea-cultivation—have been created, and the general state of the Chinese portion of the island may be described as prosperous. Some details as to the trade of the last few years will be interesting.

According to the consular reports for 1874, the total trade of Formosa in foreign vessels was :—

	1873.	1874.
Imports	£602,012	... £680,340
Exports	485,259	... 594,431
Total	£1,087,271	... £1,274,771

The total value of later years is not yet published. By far the most valuable of the imports is opium, two-thirds of the total value being due to this drug. Next in importance come cotton piece goods and woollens. The total number of pieces of all descriptions imported was 88,523 in 1873, and in 1876 the number had risen to 146,507.

Among the exports, tea, camphor, and coal at Tamsui and Kelung, and sugar at Taiwan-fu or Takow, account for almost the total value. The quantities, as stated in the *Customs' Gazette*, are as follows :—

	1873.	1874.	1875.	1876.
Tea, piculs*	15,610	24,610	41,573	58,905
Camphor, piculs ...	10,755	12,080	7,139	8,794
Coal, tons	45,177	15,221	27,665	31,593
Sugar, piculs ...	402,857	686,220	487,084	879,943

In addition to the above, some small quantities of tea were shipped at Taiwan-fu, and of sugar at Tamsui; but the amounts were quite insignificant.

There are no statistics of the trade in native vessels; but the foreign Commissioner of Customs, in his report for the year 1875, states that during the year 15,000 tons of coal were exported from Kelung in junks, and that there were exported by similar means from Tamsui 210,000 tubs of indigo, value $2,520,000, and 160,000 piculs of rice, value $320,000, besides minor exports. The amount of rice exported from the coast is enormous. So far back as 1834, it was estimated that 200 junks were employed in this trade. I do not know of any reliable estimate of recent date, but merchants talk of the large number of junks so employed. In 1872 the crop of rice failed, and rice had actually to be imported. It is not likely that this will occur again, as year by year the cultivation, already good, is becoming better and more extended.

---

* A picul is 133⅓ lbs. avoirdupois.

The statistics of trade given above are most encouraging, and it is certain that the limit of prosperity has not been reached. There is still room for much improvement, and there is every reason to expect that the next ten years will see as great an advance as the last ten. The island has, ever since its acquisition, been considered part of the Fokien Province. The Governor-General who rules over that province ought to visit the island once every three years. His visits, however, have been irregular.

Ting, lately Futai of Foochow, has been appointed Governor of Formosa, and it is said that he is anxious to have the island made into a separate province, and himself appointed first Governor-General. Ting is a most enlightened Chinaman. He has a considerable knowledge of foreign manners and customs, and is ready and willing to introduce foreign improvements. He has a little of the jealousy of foreigners which is universal among the higher class of Chinese; but he has much less of it than Li Hung Chang, and most other high officials. It is a little difficult to describe the exact position of these men with regard to progress. Perhaps the nearest approach to a correct description would be to say that they are pro-foreign and anti-foreigner. To any one coming from Europe, accustomed to hear of Li Hung Chang as the champion of progress in China, it sounds strange and inexplicable to hear residents in China talk of his anti-foreign tendencies. Men of his stamp would like to have steamers and railways, but detest foreign steamboat or railway companies, and, if they had the choice of steamers and foreigners, or no steamers and no foreigners, would not hesitate a moment to choose the latter. Progress they are in favour of, but China unassisted cannot progress quickly, and slow progress without foreign assistance commends itself much more strongly to these people, than quick progress where foreigners are the moving spirits. Under Ting as Governor, or Governor-General, there is, therefore, more chance of a province progressing quickly than under most men; but there is another reason to hope for quick progress in the case of Formosa.

Although a governor-general of a province has a great deal of power, he is not absolute ruler, and has to apply to Pekin for permission to make radical changes in his province, or to carry out any important work, and further, he has to report all that occurs to Pekin; and even in those cases where special permission may not be required, the Imperial Government may consider that the provincial governor has acted imprudently, and may remove him and substitute another who will rule more in accordance with their views.

There seems, however, to be an understanding that Formosa is to be managed differently from the mainland. It is separated from China proper by 120 miles of sea, and it is thought that it is a suitable place for experiments. If these experiments lead to any bad result, it will be annoying, but will not be ruinous. The Customs' reports for 1875 contain a most interesting and able account by Mr. Brown, of Takow, on the advances that are being made in the way of constructing roads and improving the administration of the southern provinces, and the report of Mr. Hobson deals fully with the origin and progress of the mining scheme referred to in the earlier part of this paper.

Ting, since his appointment, has been making inquiries as to the cost of railways and telegraphs. The time has hardly come when works of that description in Formosa can be expected to give a direct return commensurate with the outlay, but if the Government can spare a little money now and again to construct roads, bridges, and, if possible, railways and telegraphs, the effect will be immediately seen in the Customs' returns, which are the best indications of the prosperity of the island.

Since the above was written a memorial from Ting has appeared in the *Pekin Gazette* (translated in Shanghai 13th June 1877), asking permission to make alterations in the assessment of various districts of the island for two reasons: first, the inroads of the sea, floods, and other natural causes, have in many cases considerably altered the area and value of the districts; and, secondly, the increased value of recently-established prefectures has made the weight of taxation bear most unequally on the various inhabitants. Certain new prefectures are double the area, and pay half the tax, of certain older ones, though now both new and old are equally well and fully cultivated. He also asks permission absolutely to abolish a certain class of petty imposts of very old standing, which bring little to the revenue, and press heavily on the people, more particularly as additional amounts are extorted from the people under cover of these taxes by the local mandarins and middlemen. He observes that the increasing customs and lekin duties may be counted on to recoup the treasury for any loss they may incur by these changes. The testimony of all who know China well, whether they belong to the commercial or official class, is so unanimous to the effect that stubbornness, stupidity, and conceit are among the most marked characteristics of the Chinese, that there is no escape from the conclusion that their views are correct—still, if even one man can be found who looks for an increase of revenue through abolishing oppressive taxation, and if the Government show their appreciation of him by appointing him to a high office, the state of China cannot be absolutely hopeless.

Two or three of the present industries offer splendid fields for foreign enterprise, if reasonable facilities are granted. The cultivation of tea might be extended to an unlimited extent, and the example of India leads one to suppose—I might almost say proves to one—that the value of the leaf might be increased twofold. The cultivation has been fostered by foreign intercourse, and foreigners take a more active part in its preparation for the market than they do on the mainland of China; but the tendency at present, unfortunately, is to assimilate the practice to that of the mainland, and not to that of India. The tea in Formosa is grown in very small lots, and the growers have not sufficient capital to cultivate it so as to give the best results, even if they had the knowledge of how it should be done.

Indigo also appears to offer an opening for foreign enterprise. The 210,000 tubs exported from Tamsui in 1875 were valued at $2,520,000, or $12 per tub.

Estimating the weight of a tub at 3 cwt. this would give $4 per cwt. The indigo imported into England must be worth about 30*l.* per cwt. In the consular report for Tamsui for 1871 an analysis of Formosan indigo is given, copied from the *Chinese Recorder* for July 1870. It is as follows:—Water, 5; sand, 1; carbonate of lime, 1; indigo, 1. Assuming the colouring matter of the Formosan indigo to form one-eighth of the whole weight, and the colouring matter of that imported into England to form half of the weight, these prices give $32, or 6*l.* 8s., per cwt. as the price of the colouring matter in one case, and 60*l.* in the other. Surely there is a sufficient margin here for profit. Formosan indigo in its present state is quite unsaleable in England; but judging from the fact that it is found remunerative to print goods in England in a way to resemble indigo printing, it is probable that if Formosan indigo were improved, it would find a market, even if it were not as good as Indian indigo.

Sugar may also offer some slight inducement to foreigners. As far as I could judge from all I heard and saw, there is not much room for improvement in the growing of the cane. The preparation of the sugar is, however, imperfect in the extreme. The mills are very primitive. The cane has to be passed twice through the rollers, and even then all the juice is not extracted. The natives have got into the habit of adding much more lime than is necessary in the boiling, and the resulting sugar contains a large quantity of it, and soon destroys the charcoal in the refineries. From the moment, then, that the cane is cut, the whole process is open to great improvement. Some attempt has been made to introduce sugar-crushing machinery, and there are two Glasgow-made crushing-machines on the island. They are, however, very small, and actually in some respects inferior to the ordinary mills of the country: they consequently have not been favourably looked upon. If powerful steam-crushing machines were introduced, they would effect a great change, and, under foreign supervision, the crystallised sugar would contain much less dirt than at present. On the whole, however, sugar preparation offers a better field to the native than to the foreigner; and at least one really wealthy Chinaman has offered to buy a good steam sugar-crushing machine, if it can be shown to him at work. As this man has lately paid $500,000—or, say, 100,000*l.*—towards a fund for making roads, &c., without apparently losing his reputation of being the richest man in the island, he is well able to undertake the introduction of improvements on a large scale if he likes.

Of new industries, the most hopeful appears to be coffee. There can be no reasonable doubt that on the southern hills it might be cultivated to a profit; but it is almost a certainty that nothing can be done, unless sufficient facilities are granted to induce the investment of foreign capital.

I must now refer to minerals. The mineral wealth of Formosa has always been spoken of as immense, and, before visiting it, I had seen specimens of ironstone and other minerals which had undoubtedly been found on the island. It is, therefore, certain that some useful minerals do exist there, and it is not improbable that in the savage country there may be large and valuable mineral districts. I believe, however, I am correct in saying that absolutely nothing is known of them. There is a story current among the Chinese that there is a jade mountain in Formosa. The existence of this mountain was never believed in by foreigners, but a report came to my ears through a foreign channel that mercury was to be found on the island. I mentioned this to the mandarin who has lately been sent to take charge of the sulphur mines, and asked him if he knew anything of it. He is a man of considerable attainments and high position, and his knowledge of the English language and long connection with foreigners have given him opportunities of learning much that most Chinamen are ignorant of; nevertheless his answer was—"Yes; it is seen to glitter on the mountains." Such an answer not only proved that he was utterly ignorant of the whole subject, but showed clearly that one must be careful in accepting vague statements on such matters, even if they come from apparently good sources.

Some valuable minerals are by no means attractive in appearance; but galena, copper pyrites, gold, and many others have such distinctive characters, that specimens are sure to be picked up by the natives of any country where they are to be found; while the weight of ironstone of all descriptions, of tinstone, and of other metallic ores is likely to attract attention. I took every opportunity of inquiring whether any of these were known to exist; but no one resident in the island, either Chinese or foreigner, could produce a single specimen, with the exception of Mr. Tyzack, who kindly supplied me with a nodule of clay ironstone. It was of poor quality, but he had been able to find nothing better.

Coal, sulphur, and petroleum are the only mineral productions whose existence in considerable quantities has been proved. The coal will probably continue to be worked by the Government, and the sulphur, as I have already stated, will certainly (and I think quite properly) be kept in their own hands for the supply of their powder-mills. Petroleum exists about 10 miles south-east of Oulan. Some years ago the right of sinking wells was granted to some foreigners, and the petroleum obtained was stated to be worth 15*l.* per ton; but this grant appears to have been withdrawn. Of the rights of this case I know nothing, but I was told by some of the high officials in the island that they intended to work the wells themselves, and since leaving I hear a report that they have sent for an experienced man from America to take charge. At the present moment, then, minerals do not offer as great inducements to foreigners as tea, coffee, or indigo.

If, however, Formosa is not an El Dorado, it is an island whose future promises to be a bright one. Richly endowed by nature, it is greatly favoured by its insular position. The Chinese, always averse to change, are anxious that Formosa should form an experimental province, and are prepared to remove restrictions there, which for the present they seem inclined to continue on the mainland. Sufficiently supplied as it is with labour at a reasonable rate, and inhabited by a healthy and industrious people, it presents a splendid field for commercial enterprise.

The question has often been asked, Should such an island be left in the hands of such a government as the Chinese? To argue for a moment that the Chinese Goverment is in any respect superior, say to the British, would be ridiculous, but to suggest that therefore the Chinese should be deprived of part of their possessions is highly improper. Their sovereignty over the island is better established than ours was in New Zealand a very short time ago. They are employing their military in making roads through the savage districts, the most effectual way of eventually subduing them, and they seem anxious to develop the resources of the country. In more than one European newspaper there have been suggestions as to annexation, but any attempt at such a thing would, in my opinion, be nothing short of robbery.

G. James Morrison.

Reviews.

——:o:——

COLONEL MEADOWS TAYLOR.*

In Colonel Meadows Taylor we lost a valued contributor to this magazine, who took a special interest in the various Indian Surveys which it has been one of our principal objects to make more generally known and appreciated. His review of Dr. Hunter's *Orissa* in our number for July 1872, and other contributions, show with what keen interest Colonel Meadows Taylor followed the efforts of those younger men who are working for the good of India by accumulating and classifying accurate information. No one would more thoroughly appreciate any successful attempt to illustrate the life and modes of thought of Eastern people, and he showed this in his warm and cordial welcome of Mr. Palgrave's *Hermann Agha* in our number for September 1872. But his loss is more especially felt by us, because we can never again receive that valuable and weighty advice on matters relating to Indian questions, and especially to revenue surveys and to archæology, from which we have often derived such benefit in recent years.

The story of the life of Meadows Taylor is one which it was right to give to the world, for it teaches many lessons—it will cheer and encourage the young and friendless when the difficulties before them seem too great for them to surmount, it will show them that honours and advancement are within their reach, and it will strengthen them in their resolution to deserve success. Such a story will do more good than any amount of general advice or admonition, for it teaches by example, and proves how certainly a life of steady and resolute perseverance in the path of duty will be rewarded. For Meadows Taylor was not one of those men who have gone to India with many introductions, to be pushed forward by relations and by the influence of patronage. No one could have been more friendless, and indeed unfortunate, at the opening of his career. As a boy of fifteen he was sent out to Bombay in 1823, upon a vague and fallacious promise of employment in a merchant's office. When he arrived, the house of business proved to be no better than a shop, and its chief an embarrassed tradesman. The misfortune-stricken boy found one friend, who obtained for him a commission in the Nizam's contingent. All his future advancement was due entirely to himself. But Meadows Taylor was wholly without self-assertion, and those pushing qualities to which the success of many friendless men is often due. To those who knew him, and to those who read the story of his life, his modesty and single-mindedness are the qualities which are most prominent in his character. He used the talents which God had given him to the utmost of his power for the good of the public service, without one selfish end, and without a thought as to whether he was more or less gifted than his neighbours. Yet he was endowed with rare gifts of imagination and memory, steadied by habits of self-control; and his ability was accompanied with prudence and sound judgment.

No man could have been better suited to fill the extremely difficult post of Resident, and virtually of administrator in a remote and somewhat turbulent native State. In this capacity he worked for many years at Shorapur, in the Deccan; and while maintaining the dignity and superiority which were called for by his position, he ever had a warm sympathy for the people, and treated them with respect as well as kindness, so that he won not only their esteem but their love. No Englishman in India was ever more beloved by the people among whom he worked; and certainly the successful administration of a State like Shorapur, where every branch of government must be undertaken by one unaided man, requires very exceptional qualifications. Colonel Meadows Taylor was an excellent linguist; he acquired a considerable knowledge of law; he studied botany and geology, because he observed the direct bearing of those sciences on the productiveness of the soil; and he taught himself the science of engineering, in order that he might design and execute important works of irrigation. Above all, he was richly endowed with imagination, without which there cannot be a good administrator, especially when dealing with people of a different race. Indeed, it is not too much to say that all his other acquirements would have been little worth, if the gift of imagination had been absent.

Those fascinating pictures of native Indian life with which Meadows Taylor enriched our literature are due to the same faculty which enabled him to advance the moral and material well-being, while he won the love and respect, of the people who were placed under his charge. His earliest work has stood the test of time, and the *Confessions of a Thug*, in which the manners and superstitions of the people of India are portrayed with wonderful fidelity, still retains its reputation. But his later romances, designed to mark the principal epochs of Indian history, have exercised an equally fascinating power over their readers. *Tara* is intended to give a picture of the rise of Mahratta power, and describes, as no history can do, the ways of life and modes of thought of the different races of the Deccan two centuries ago, and vividly brings home to the reader not only great historical events, but the scenery amidst which they were enacted. *Ralph Darnell* portrays the events in the days of Holwell and Clive in Bengal; *Tippoo Sultaun* introduces us to the great events in Southern India in the time of Cornwallis; while *Seeta* treats of the terrible period of the mutinies in 1857. They form a complete work in themselves, and Mr. Reeve truly says that they deserve to retain a lasting place in English literature.

---

* *The Story of My Life.* By the late Colonel Meadows Taylor, Author of "Confessions of a Thug," "Tara, a Mahratta Tale," &c. Edited by his Daughter, with a Preface by Henry Reeve. Two vols. (Blackwood, 1877.)

When Meadows Taylor left Shorapur, in 1860, he took away with him the love and regret of a whole people, and, to his last hour, the memory of his long and useful service in that little State must have been a source of satisfaction and happiness. His departure was the occasion of an address from 990 of the principal inhabitants, in which they enumerated all the benefits he had conferred upon them. "None of them," he tells us, "had been strangers to me; many had grown up from children under my sight, and had now children of their own about their knees; others were old and grey-headed; and many whom I had known had gone to their rest. It was not an easy task to leave them all, and I do not think I am forgotten there even now. I intended to depart quietly in the night; but the people were assembled in the streets; there was a sad wailing of women, while the men walked by me in utter silence. Now and then some one would exclaim, 'We have no one now to care for us; but our women will sing of you as they grind corn in the morning, and will light their lamps in your name at night. Come back to us; oh! come back!' People ask me what I found in the natives to like so much. Could I help loving them when they loved me so? Why should I not love them? I had never courted popularity; I had but tried to be just to all, and to secure to the meanest applicant consideration of his complaint by allowing unrestricted communication with myself."

He had ruled over 36,000 square miles of area, and a population of 5,000,000 of people, and gained a place in their affections and respect by no other means than by exercising simple courtesy and justice to all.

The justification of England's Empire in India is that she sends men like Meadows Taylor to bear rule there.

His last years, after returning home, were passed very happily with his family, and he was much occupied in literary work. He paid one last visit to India, and died, on his way home, at Mentone, on the 13th of May, 1876.

UPPER EGYPT.*

Egypt is a country which, from its eventful history and the astonishing antiquity and magnitude of its monumental remains, must always command the attention and interest of educated men, while its geographical position and capability of development may not improbably obtain for it a high importance in the world's future annals. This future is one in which Eglishmen must feel increased interest, so long as Egypt affords the shortest route to their Eastern Empire. And amid much that is ephemeral in the literature descriptive of Egypt, it is pleasant to light upon two works, dissimilar indeed, but both the fruit of close observation, based on continued residence in the country.

Of the country life of the Egyptians we have long wanted some full and trustworthy description. Lane's accurate and picturesque work deals chiefly with the people of the capital, and it was much to be wished that some one living on terms of intimacy with the people as one of themselves should do for rural scenes the same as Lane had done for those of Cairo. Dr. Kluuzinger's work has admirably supplied this want. As an inhabitant for several years of the little upper-Egyptian sea-port of Koseir, on the Red Sea, as a doctor, Government official, and naturalist, he has had ample opportunity for thoroughly studying the language, and for becoming acquainted with the country and the people. As Dr. Schweinfurth, in an able preface, puts it, "Among fishermen and mariners, among pilgrims and camel-drivers, among petty dealers and lowly scribes, our friend of humanity has sacrificed the best years of his life." The same authority pronounces that Dr. Klunzinger's work will be in future an indispensable addition to the library of every Nile tourist, however small it may be.

The book is divided into seven chapters, the first being devoted to a description of four days in a country town, the second to the incidents of travelling by land and river, and the next to working days, holidays, and days of mourning. Then follow a description of the desert, and a caravan ride through it; two chapters treat of the Red Sea, and its natural features and treasures; and the last deals with popular beliefs and superstitions. The scenes of Egyptian daily life and the types of the populace are most minutely drawn. The author does not attempt to draw judgments or conclusions, but simply to portray facts, and in this task he has been undeniably successful. We gain an insight into Egyptian character, idiosyncrasies, and institutions, which convey a most interesting and vivid picture of the people and country. Among other things, the reader will gain an exact notion of the institution of slavery, such as it exists in Egypt; how far it is engrafted in the ideas of the people, and what efforts have been made for its abolition. Whole caravans of slaves, it appears, are confiscated from time to time, and the slaves escorted to the capital, where the Government takes charge of them, the boys being generally turned into soldiers, and the girls sent into service. But as it is often a great misfortune for the foreign bird suddenly to gain its liberty in a strange land, the author points out that anti-slavery societies, *per se*, are not sufficient, but that humane societies should be formed for the purpose of sending back to their native lands those who have just been made free. Although slavery is still connived at by the lower Government officials, the vigilance of the higher authorities has done much to put down its abuses, as every slave reporting himself to the police at once becomes free. Another special feature of Dr. Klunzinger's work is the information he gives us regarding the Copts, or Egyptian Christians, of whom Lane has failed to afford us a sufficient account. We feel tempted to dwell on the description of the Coptic mass and its ritual, the relations between the Moslem and the Copt, the worship and the every-day life of the former. But, in truth, it is impossible, within the limits of a brief review, to convey a just notion of this work, which owes a merit, which will, we prophesy, receive a sure and ample acknowledgment, to the scrupulous fidelity of a series of innumerable and varied pictures of Egyptian life in all its phases.

---

* *Upper Egypt: Its People and its Products.* By C. B. Klunzinger, M.D. With a Prefatory Notice, by Dr. George Schweinfurth. (London: Blackie, 1878.)

The Monuments of Upper Egypt. A Translation of the *Itinéraire de la Haute Egypte* of Auguste Mariette Bey. (London: Trübner, 1877.)

The monuments of the country have, of course, formed the subject of a number of treatises of a more or less exhaustive character. Mariette-Bey's little work (which has been excellently translated by M. Alphonse Mariette, of King's College, London) is designed to supply such information as will enable the traveller to understand the meaning of the monuments. Our only regret is that the author has not extended his researches so as to include the wonders south of Philæ, which forms the limit of his investigations. But as far as the region to the north is concerned, he has supplied us ably with a general account of the history, the religion, the language and writing, and the general architectural and monumental features of the Egyptian structures, followed by a detailed description of the monuments of each locality. We very heartily second his earnest appeal to travellers of all nationalities to aid in protecting the monuments from further mutilation and defacement. We have only to remark in conclusion that with his general subject Mariette-Bey appears familiar, both from his personal researches and the study he has evidently devoted to such works as those of Wilkinson, Brugsch, and Birch; and that the information has been carefully condensed within a volume of very handy dimensions.

—:o:—

Informe de la Exploracion de los rios Perene y Tambo. Presentado al Señor Ministro de Gobierno y Obras Publicas, por *Arturo Wertherman*, Inginiero de Estado. (Lima, 1877.) Pp. 48. Map.

This is a valuable Report, by Mr. Wertherman, to the Peruvian Government. Mr. Wertherman has already done much valuable geographical work in exploring the Peruvian tributaries of the Amazon, which we have noticed in our numbers for October 1873 (p. 267) and December 1874 (p. 388). He was a member of the Hydrographic Commission, under Admiral Tucker, and he himself explored part of the Huallaga and the Pongo de Manseriche. He also fixed numerous positions astronomically, in the departments of Loreto and Amazonas. In his present report he gives an account of an adventurous and successful descent of the Rivers Perene, Tambo, and Ucayali, in specially constructed *balsas*. In October 1876, Mr. Wertherman, accompanied by the French minister, Comte d'Aubigny, reached the confluence of the Rivers Chanchamayu and Paucartambo, where he found two companies of infantry, under Colonel Don Francisco La Rosa, engaged in making a road to the point of embarcation. On the 20th of October they began the construction of the *balsas*, or rafts, and, on the 3rd of November, the Expedition started. It had been joined by Mr. Henry Whitely, an English naturalist, and was thus organised. The canoe 'Pardo,' under the command of Mr. Wertherman, with a crew of four young boatmen from Chasuta, on the Huallaga, led the van. Next came the 'Pichincha,' under Toribio Cruz, next the 'Junin,' under Mr. Whitely, and last, the 'Prado,' under Captain Tirado. The voyage was successfully performed, and the Expedition reached Sarayacu, on the Ucayali, on the 17th of November. In his report Mr. Wertherman gives details respecting the currents of the rivers, the navigation, the wild Indians, and the meteorology. He observed for latitude and for longitude by chronometer at numerous points, and also for the variation of the compass; and his report is illustrated by a map of the Rivers Perene and Tambo.

Log Book.

—:o:—

The Dutch Arctic Reconnaissance.—In the *Threshold of the Unknown Region* (commenced in our number for July 1873), the object of which work was to advocate the despatch of that English Arctic Expedition which returned last year after achieving a memorable success; we also urged upon the Dutch people the duty of resuming their Arctic enterprises, and, reviving the memory of former achievements, of once more taking their place among Polar explorers (p. 53, 4th edition). Those words were not spoken in vain. The people of Holland went to work in the right direction, steadily and methodically. In 1875 Lieutenant Koolemans Beynen was sent to learn ice-navigation under Sir Allen Young, in the 'Pandora,' and he made a second cruise to Smith Sound in 1876.

The next step was to form a Dutch Arctic Committee, which has been preparing the way for a further advance during the present year. At a meeting of this Committee, which took place at the Hague on November 17th, it was resolved to despatch a small sailing vessel in May 1878, to make a summer cruise in the Spitzbergen and Barents Seas, and thus form a school for Arctic sailors, who will, in due time, carry forward across the threshold of the unknown the glorious old banner of Barents and Heemskirk.

A new schooner is to be built at the wharf of Huijgens and Meursing, at Amsterdam, strengthened and fortified for navigation in the ice. She will be of 85 tons burden, with three water-tight compartments, an outside planking of very hard wood, great strength of beam, an overhanging stem, a spare rudder, and will be further strengthened by iron platings round the bows. As a necessary precaution, she will have eighteen months' provisions on board, and all necessaries for an Arctic winter, although a summer cruise only is intended. The crew will consist of twelve men, all told, and the vessel will be schooner-rigged, with a flying square foresail. Although the trip will be a private undertaking, the commander will be a naval officer, Lieutenant (*1st classe*) A. de Bruyne, and there will be two junior officers under him, one of whom will be Lieutenant Koolemans Beynen.

Thus, after an interval of a hundred years, the Dutch tricolour will once more be carried across the Arctic circle. It is worthy of special remark that this cruise is not paid for by the Government, nor by a few wealthy private gentlemen, but by the voluntary contributions of the whole people of Holland. It is the Dutch nation, with the approbation and support of the royal members of its beloved House of Orange, which now re-enters a field where in former days it won imperishable renown. We heartily wish all success to this well-conceived and carefully-planned enterprise; and we sincerely trust that it will be the commencement of future more extensive work in the field of Arctic research.

Further Results of the Arctic Expedition.—The Fossil Flora.—The valuable scientific results of the Arctic Expedition are gradually becoming known through the preliminary reports, although it will be some time before they are published in their entirety. In our number for August 1877 (p. 213) we noticed Captain Feilden's paper on the birds, and in that for October 1877 (p. 268) we gave an abstract of those on the mammalia, fishes, crustacea, mollusca, and post-tertiary fossils. A more complete report on the birds was published in the *Ibis* for October 1877 (No. iv.). A very important report on the echinodermata by Dr. Duncan and Mr. Sladen will shortly be published.

Meanwhile, an interesting communication from Professor Heer, of Zurich, was read at the first meeting of the Geological Society on the 7th of last November, on the fossil plants discovered by Captain Feilden, the Naturalist of H.M.S. 'Alert,' in Grinnell Land.

The learned Professor has no doubt that the deposits of lignite found in the vicinity of the 'Discovery's' winter quarters belong to the miocene epoch. This conclusion is arrived at from an examination of the fossil flora. The collection submitted to him consisted of twenty-five species. Of these, eighteen species are known from the miocene deposits of the Arctic zone. The Grinnell Land miocene flora shares seventeen species with Spitzbergen (lat. 78° 19′ N.) and eight species with Greenland, and consequently it most closely approaches the northern Spitzbergen flora. There are two species of *Equisetum*, ten *Coniferx*, a *Phragmites* and a *Corex*, and eight dicotyledons, namely a poplar, two birches, two kinds of *Corylus*, an elm, a *Viburnum*, and a *Nymphœa*. Among the conifers are the *Torellia rigida*, the *Taxodium distichum-miocenum*, a new species called *Pinus Fieldeniana*, *Pinus polaris*, *Pinus abies* and a spruce. The leaf-covered twigs of *Taxodium distichum-miocenum*, which is one of the most abundant plants of Grinnell Land, appears in many varieties. This remarkable tree, now only found existing in the south of the United States and in Mexico, lived and bloomed, during the miocene period, as far north as latitude 82°.

In Grinnell Land, as in Spitzbergen, the genus *Pinus* possesses the greatest number of species. Professor Heer mentions, as a most interesting fact, that in Grinnell Land two twigs of the fir (*Pinus abies*, Lin.), still covered with leaves, were found; and that this species of fir lived during miocene times in Grinnell Land as well as Spitzbergen, and doubtless extended as far as the Pole, if land then existed so far north. Now the extreme northern limit of this tree is in Scandinavia, in latitude 69° 30′ N. The Arctic miocene forest was, doubtless, inhabited by animals, but hitherto only a single elytron of a beetle (*Carabites Feildenianus*, Hr.) has been discovered, lying with the plants. The presence of a *Nymphœa*, or water lily, indicates the existence of fresh-water which must have remained open a great part of the year. Professor Heer remarked that a further investigation of this important locality would, no doubt, produce more animal remains, while it also promises a further rich result in plants. The discussion, after Professor Heer's paper had been read, was very satisfactory; and Dr. Duncan, Dr. Murie, and other eminent men of science bore their testimony to the valuable results obtained by the late Expedition.

Use of Arrows by the Arctic Highlanders.—With reference to the remarks on this subject in our last number (p. 303), it appears from the narrative of the voyage of the 'Polaris' (p. 451), that a party of Eskimo from the western side of Smith Sound, about Cape Isabella, crossed over in an umiak and five kayaks, about five years before the survivors of the crew of the 'Polaris' wintered there in 1872-73. They introduced the use of the bow and arrow. That weapon was not previously used by the Arctic Highlanders, as stated by Kane and Hayes, and in my paper on that tribe referred to at p. 303 of the above number.

Clements R. Markham.

The Arctic Officers.—A year has now passed away since the return of the Arctic Expedition, with its tale of sufferings nobly borne, of difficulties overcome, and of success achieved. Since then the numerous valuable results have been diligently worked out, and the important volumes which are to record them will soon be published. Meanwhile, the officers who have acquired experience in ice navigation and in sledge travelling, and who are now the hope of future Arctic discovery, are serving in various parts of the world.

Sir George Nares is still busily engaged in the preparation of the history of the Expedition, and Captain Feilden is giving his able assistance in working up the zoological, botanical, and geological results. Captain Markham has just passed through a course of torpedo instruction; Commander Aldrich is in command of H.M.S. 'Sylvia,' surveying on the coast of China; Beaumont is commander of the 'Bellerophon' (flag ship), in the West Indies; and Parr, of the 'Audacious' (flag ship), in China. Lieutenant May is an instructor in the torpedo course, and is attached to H.M.S. 'Vesuvius;' and Lieutenant Egerton is studying at Greenwich, for the torpedo staff, borne on the books of the 'Vernon.' Rawson and Archer are Lieutenants in the 'Alexandra' (flag ship), in the Mediterranean. Fulford is First Lieutenant of H.M.S. 'Hart,' in China; and Conybeare is a Lieutenant on board the 'Raleigh,' in the Mediterranean.

Dr. Colan has just received the appointment of Deputy-Inspector of Hospitals, at Jamaica; Dr. Ninnis is Fleet Surgeon of H.M.S 'Tourmaline;' Dr. Moss is in H.M.S. 'Topaze,' at Kingstown; and Dr. Coppinger in H.M.S. 'Revenge,' at Queenstown. Mr. Mitchell is Paymaster of the 'Wild Swan,' in China. The four engineers are also actively employed. Mr. Wootton is Chief Engineer of H.M.S. 'Gorgon,' tender to the 'Cambridge,' at Devonport; Mr. Cartmel has been engaged in superintending the building of the 'Cleopatra,' at Glasgow; Mr. White is attached to H.M.S. 'Asia,' at Portsmouth, for torpedo instruction; and Mr. Miller is Engineer of H.M.S. 'Bacchante.'

It is the wish of every true geographer that it may not be long before the country again has need of the Arctic services of at least some of these gallant and now veteran explorers.

The Palæocrystic Sea.—M. Eynaud, the French Consul in Crete, in a letter to M. Maunoir, the Secretary of the Paris Geographical Society, has criticised the term "palæocrystic" for the sea of ancient ice discovered by the Arctic Expedition. He observes that the compound χρυστίκη means nothing; and that from the adjective *χρυσταλλος* the compound *παλαιοχρυσταλλίνη* would be perfectly irreproachable. But the term "palæocrystalline" has the inconvenience of suggesting the idea of a cut glass, rather than that of an ancient mass of sea ice. He thinks that derivatives from the synonym *παγος* or *παγετος* are preferable. The adjective of *παγος* is *παγωδης*. This, again, is objectionable, as suggesting the idea of a Chinese pagoda. But though *παγητιχος* is not used in ancient Greek, it is in conformity with the rules of Hellenic derivation, in the same way as *παθητιχος* correctly comes from *παθος*. He, therefore, submits that the form which best combines convenience with accuracy is "palæopagetic"—the "Palæopagetic Sea."

Captain Wiggins.—In our number for March 1877, Captain Wiggins gave an account of his enterprising voyage to the Yenisei, where he had left his steamer, the 'Thames.' In the same month he set out overland to join his steamer, accompanied by Mr. Henry Seebohm, of Sheffield. His intention was to bring the 'Thames' home again with a cargo, but we regret to hear that he has been unsuccessful. When the river-ice broke up, the vessel lost her rudder and sprang a leak, in latitude 66° 30′ N. She, however, was taken about 150 miles lower down the Yenisei, where she ran on a sandbank and was finally lost. Mr. Seebohm had had a schooner built at Yeniseisk, called the 'Ibis,' which they were towing at the time the steamer ran aground. In this vessel they sailed down the river for 700 or 800 miles, reaching 71° 30′ N., but were still 200 miles from the mouth of the Yenisei. Mr. Seebohm sold the 'Ibis,' to M. Sideroff, and she has since made a successful voyage, arriving safely at Vardö, in Norway. Mr. Seebohm returned home by land.

England and Peru.—In her commercial relations with Great Britain, Peru always has a considerable balance to her credit. From January to July 1877 the value of the guano exported to England was 1,254,270*l.*; of the nitrate, 549,628*l.*; of the wool, 255,896*l.*; of the sugar, 1,207,200*l.*—total 3,226,994*l.*; while the imports from England only reached a value of 411,061*l.* The large credit with England serves to pay the differences existing against Peru in her accounts with other countries; for she has a deficit in her accounts with Chile, the United States, &c. The consumption of guano has decreased in Great Britain to the extent of 170,396*l.*, as compared with the first half of 1876. The consumption of nitrate has also decreased to the alarming extent of 612,085*l.* But the exports of wool and sugar have increased by 72,904*l.* and 480,225*l.* respectively. One satisfactory sign is that the imports have decreased enormously since 1873. Economy and prudence seem gradually to be taking the place of waste and extravagance.

Death of Professor Orton.—We regret to have to announce the death of this distinguished explorer, whose previous labours in South America were noticed in our numbers for August 1873 (p. 213) and February 1874 (p. 474). His last visit to Peru was undertaken with the object of exploring the important tributaries of the Beni, especially the Madre de Dios and Ynambari. He was a member of the Vassar College (New York), and had made two previous journeys in South America, with valuable results. On this occasion he had entered Moxos, and had penetrated as far as Trinidad, taking numerous hypsometrical and other observations. But he appears to have returned, owing to ill-health, and died at Puno, or (as one report says) on board a steamer while crossing Lake Titicaca. He was buried on a small island in the Bay of Puno.

Don Francisco P. Moreno.—The Report on the exploration of the River Santa Cruz, in Patagonia, by Señor Moreno, which we published in our number for August 1877, p. 209, is not the first valuable contribution to geographical knowledge which has been made by that eminent explorer, whose principal object has been the collection of anthropological data. In 1873 he made a journey to Carmen, and in 1875 he visited the Lake of Nahuel-huapi, one of the sources of the Rio Negro. The narrative of these expeditions will be published next year. Señor Moreno then explored the northern provinces of the Argentine Republic, with the object of collecting antiquities for comparison with those he had obtained in Patagonia. He was so fortunate as to obtain 300 specimens of pottery and worked stone, including figures of lizards and of human beings. In October 1876 he proceeded to the Patagonian coast, and made further collections at Chupat and Port Desire, before commencing the exploration of the Santa Cruz. He has discovered traces of the existence of a race in remote times, quite distinct from those which now inhabit this region. He has a collection of 400 crania of all types, ancient and modern; and he has found that a dolicocephalic race lived in Patagonia in ancient times, which was succeeded by the present brachycephalic race. He considers the dolicocephalic people to have been the primitive race of America. Some of the crania are so ancient as to be half-petrified, and some of them resemble that of Neanderthal.

Señor Moreno has presented his extensive anthropological, zoological, and palæontological collections to the Argentine people, to form the nucleus of an Anthropological and Archæological Museum at Buenos Ayres, which is about to be founded with the distinguished explorer himself as Director. His collection consists of more than 400 skulls of the different races which have peopled the Argentine Republic, and a great number of objects of stone, clay, and of weapons, among them 4000 arrow-heads worked by the ancient Patagonians. Señor Moreno intends to prepare a duplicate collection for the Anthropological Institute of London.

Portuguese African Exploration.—The Portuguese Expedition will leave the west coast at the mouth of the River Cemene, and will explore that river to its sources. At Bihé it will receive some reinforcement, and thence it will proceed to discover and explore the Cubango, the source of the Quango, and the Mossambo Range; then striking the upper Zambesi, and ascending that river to its sources. It will then enter the lake region, make the circuit of Lake Bangweolo, strike thence to the Nyanza, cross that lake, and proceed to Mozambique. It will report upon the most practicable route from the east coast, and on the commercial relations between the two Portuguese coasts and the rich central region. Major Serpa Pinto will accompany the Expedition, and Mr. Silva Porto, the well-known merchant and explorer, has also offered his services.

The Slave-Trade on the Upper Nile.—A terrible picture of the slave-trade and its attendant horrors about the region of the Bahr-el-Ghazal is given in the *Esploratore*, a new monthly journal, published in Milan. The writer of the letter is one of Gordon Pasha's Expedition. He remarks:—The chief *Seribas* on the Bahr-el-Ghazal, which form stations for the slave and ivory trades, are twelve in number. Besides these, there used to exist two others, since abolished by Zevir Bey, who, after being made *Mudir* of Shakka, refused to keep up the force necessary for the maintenance of these seribas, and obtained all the ivory that he had to remit to Cairo by violence from the natives. Each seriba has attached to it from 150 to 200 soldiers, two-thirds of whom are armed with guns, and the rest with lances. In their expeditions, which last from six to seven months, they are commanded by a Vekil, or agent of the proprietor, and an officer, and are accompanied by a standard-bearer and trumpeter. Every soldier contracts for a year, with the option of renewal, if both parties consent. These are expected to support and clothe themselves, their pay being issued to them in kind, viz. cloth, coffee, sugar, tobacco, fezzes, cattle, and slaves. As soon as a village has been captured and sacked, two-thirds of the slaves and cattle fall to the share of the Vekil, as well as all the ivory, and the remaining third to the soldiers. The soldier who thus becomes a slave-owner is allowed to let his slaves out to the seriba, but not to claim their pay. He never engages in hunting, but frequently becomes possessed of ivory, which the slaves convey from the seriba to Meshra-el-Rek, the place of embarkation, without the master reserving any right thereto. It is reckoned that the Vekils pocket from about ten to fifteen times the value of the salaries they pay, while the gain of the soldiers, accruing as it does from the cattle and slaves, prompts them to acts of the most revolting cruelty.

As soon as an expedition arrives at Meshra, the slaves are shut up in enclosures, guarded by sentinels, and are employed in cutting up and smoking beef for the journey. The sufferings and fatigues of the previous journey, the close imprisonment in a small, confined area, the exposure to the tropical sun, and the fearful exhalations from the putrifying meat, and from the unburied corpses of those which have died in their midst, reduces the survivors to mere skeletons.

About the middle of May 1876, these Vekils arrived at Meshra with a great quantity of ivory, having slain entire tribes, reduced to slavery about a thousand women and children, and captured six thousand cattle. Other cruelties are cited by the author, who remarks that his figures are reliable and the facts notorious. The Vekils come chiefly from Khartum, and the soldiers from Dongola. The former arrogate to themselves, in some instances, official permission from the Khedive to collect ivory, slaves, and cattle.

Site of the Battle of the Granicus.—Dr. Henry Kiepert contributes to the *Globus* an account of an examination made by him, in 1842, of the site of the great battle fought between Alexander and the Persians, on the banks of the Granicus, in the year B.C. 334, where the Macedonians were so signally victorious. Herr Kiepert states that his researches had a limited scope, owing to successive downpours, which had made the loam soil of the valley an impassable slough. But he furnishes a sketch-map of the site and its immediate vicinity, and thereon he shows some high ground, abutting on the western bank of the river, which he had little difficulty in recognising as the eminence where the Persians were posted to receive the attack of the Greeks. Dr. Kiepert observed also that the river at the point where he crossed it, Chinar-Kopru (Plane-Tree Bridge), although tolerably wide, was only $2\frac{1}{2}$ feet deep in its deepest part. This, he shows, fully justified the remark of Alexander, that, after crossing the Hellespont, it would be a mighty disgrace to be stopped by "this brook" (*σμικρὸν ῥεῦμα*). Arrian calls this a scornful expression; but, judged by Dr. Kiepert's description, the river must certainly have appeared contemptible. Dr. Kiepert suggests that the vicinity of the spot to the Sea of Marmora, a much-frequented trade-route, might induce some traveller to complete the topographical examination of the battle-field, especially to the west, where he himself was prevented from going.

Correspondence.

——:o:——

THE TURKS OR MAGYARS.

To the Editor of the "GEOGRAPHICAL MAGAZINE."

DEAR SIR,—The conclusion arrived at in my previous letter, that the Magyars were Turks, I deem to be of such crucial importance in elucidating the ethnography of Eastern Europe, that I should like to fortify it with some further facts. Constantine Porphyrogenitus has a curious notice about this region, which becomes very valuable in view of our contention. Speaking of the Pechenegs, he says they at first lived on the Atel and the Geech—*i.e.*, on the Volga and the Yaik, or Ural, and were in contact with those peoples called Mazari and Uzi (*Stritter*, iii. 938). This name Mazari has by some been held to be a corruption of Khazar, while others have seen in it a form of Magyar, a view which, I think, very probable indeed; and, if so, the earliest use of the name Magyar by a Western writer. It is noteworthy that the Mazari are linked together with the Uzi in this passage. Now, it is a curious fact that hardly any of the great migrations of Nomades known to me have been so complete that some portion of the race has not been left behind, and it is interesting to inquire if this was not so in the case of the Mazari or Magyars.

In the east of Russia, and within the borders of the old kingdom of Kazan, there is a well-known Turkish tribe, closely allied to the Bashkirs, which is known to the Russians as the Mescheriaks; while a portion of the inhabitants of the governments of Nishni Novgorod, Pensa, Saratof, Simbirsk, and Tambof still call themselves Mishar. The *ak* in Mescheriak, like that in Ostiak, Votiak, &c., &c., is a mere locative ending. There is still a district called Mestchera, between the Oka and the Upper Sura. This was an independent principality until the days of the famous Dimitri Donskoi, who, we are told, bought it from its prince, Alexander Ukovitch, who had been converted to Christianity

(*Karamzin*, French edition, v., 90). Princes of Mestchersk are mentioned later (*id.* v., 316).

These Mescheriaks are by no means a new people. They are mentioned in the pages of the old Russian chronicler, Nikon, in the MS. History of the Czar Ivan Wassilivitch, who reigned from 1462 to 1505, &c., where their name occurs as Moshars or Mashars (see Veliaminof Zernof, *Untersuchung ueber die Kazimofschen Zaren, &c.*, 1, *note* 15); but it occurs even earlier than this, namely, in the pages of Nestor, where they are mentioned as neighbours of the Cheremisses and the Mordvins.

It would seem that, until the seventeenth century at least, they still lived on the Lower Oka, and in the government of Simbirsk. Thence they removed to the neighbourhood of the Bashkirs, in the Southern Urals. M. Vel. Zernof suggests that this migration took place, probably, in the year 1688 (*op. cit.*, i., 145). They speak a Turkish dialect, and greatly resemble the Bashkirs in their manners and customs. They are, however, more cultivated and better Mussulmans than the latter (Muller, *Ugrische Volkstamm*, i., 160).

Fischer, the historian of Siberia, Schafarik (ii., 235), Klaproth, &c., are agreed in identifying the name and people of the Magyars with the Mescheriaks. Most writers also identify them with the Megere, a tribe of the Khazars, mentioned by Constantine Porphyrogenitus.

I read a paper at the meeting of the Oriental Congress at St. Petersburg, on the question whether the Khazars were Ugrians or Turks, and showed that almost all the evidence we possess goes to show that, whatever they may have been originally, that in the days of their grandeur they probably spoke a Turkish language. We know they dominated over the races living in the valleys of the Volga and its tributaries, and were the lords of the Eastern Bulgarians and of the Hungarians before their great migration. If the Magyars were the same race as the Meschera of Nestor, as we have tried to show, they, doubtless, like the other tribes of the Volga, formed part of the Khazar Empire.

Now, on turning to the account of the Khazars by Constantine Porphyrogenitus, we find him saying, that a civil strife having arisen among them, certain of their tribes were beaten, and fled to the Turks, in the Patzinakitan territory—*i e.* in the territory afterwards occupied by the Pechenegs. The names of the fugitive tribes were the Kabari, the Neke, the Megere, the Kurtugermati, the Tariani, the Genach, the Kare, and the Kase (*Stritter*, iii., 312). All these, apparently, were included in the common name Kabari. This name occurs, I believe, now for the first time. It is well known in the legendary history of the Hungarians, under the form Kobor, which was apparently its proper form, and which means a vagabond (Sayou's *Histoire des Hongrois*, 19, *note;* Foldvary, *Ancetres d'Attila*, 184). It is, therefore, a mere translation of the Turkish name Kazak: and it is a curious fact that Kasachia and Kabardah are terms designating apparently the same part of Circassia, as if they connoted the same thing. I look upon Kabari as the generic name given to the whole of the fugitives, and believe that Constantine has enumerated the Kabari as one of the eight tribes by mistake.

Putting aside the Kabari, we have seven tribes left, which have been identified, with great probability, as the Hetu Mogers, or Seven Mogors, of the Hungarian legends. Moger is the Latin form of Magyar, and it will be seen that Megere is one of the tribes mentioned by Constantine, and has been so identified by most critical historians, except a very few patriotic Hungarians. The name Megere is, in fact, as Schafarik has shown, the same in form as the Russian Metchera or Mescera (*op. cit.*, ii., 235, *note*).

Let me now call attention to a fact I have not seen elsewhere noticed. A second of these tribes is called Tarian. Now, in the notices already quoted from the mediæval Russian chroniclers, we find the tribes of Kazan enumerated as the Chuvashes, Cheremisses, Mordvas, Moshars, and *Tarkhans*, and the last name is also written Tarkhon (Vel Zernof, *op. cit.*, i., 145). The Russian writers have passed this name by, with the simple remark that it was a title. It is quite true that Tarkhan was a Mongol title, but it is equally true that in these notices Tarkan or Tark Khan is a tribal name, and its mention with Moshar is very important when we find Tarian, which I look upon as the same name, mentioned with Megeri. Of the other names, Kuturgurmati may be compared in form with Jur*maty* and Chur*mati*, clan names among the Bashkirs (Klaproth, *Asia Polyglotta*, 221). It was probably the same tribe as that called Cutziagiri by Jornandes, and Kutriguri by Theophaner. The other names I should be grateful for some illustration of. I believe that the whole of the tribes which separated from the Khazars were more or less of Turkish blood, and that they have their best representatives in the modern Bashkirs and Meshkeriaks. Constantine tells us they joined the Turks, by whom he means the Hungarians. It may be that this invasion constituted the latter people Turks, for that name was not always applied to them, as Constantine himself says, telling us further they were formerly called Sabarto Asphali.

The Hungarians, who were thus joined by the Magyars, were an old race on the Pontus, and were no doubt the Hunuguri or Onuguri of other writers. Constantine tells us they lived formerly near the Khazars, in the land of Lebedias, which, he says, was watered by the River Khidmas, otherwise called Kingulus. Klaproth argues plausibly that this latter is the same name which Constantine elsewhere writes Syngul, and is the Ingul of our own day, an eastern feeder of the Bug (*Tableaux Historiques, etc.*, 280). A more important river with a similar name is the Inguletz, a tributary of the Dnieper. The probability is, that the land of Lebedias answered largely to the modern Ukraine and Nogay Steppe, between the Bug and the Don and the town of Lebedin, in the government of Kharkof, and that of Lebedean, in that of Tambof, probably retain the memory of the name Lebedias. Klaproth remarks that Lebed means a swan in Russian. I may add that Constantine calls the chiefs of "the Turks" boebodai or voivodes. This word is generally deemed of Slav origin, but M. Horvath claims it as Magyar (Sayous, *op. cit.*, 10, *note* 3). It is certainly curious to find the chiefs of either a Ugrian or Turkish race called by a Slavic title.

Out of the land of Lebedias they were driven by the Pechenegs, and sought shelter in that of Atelkuzu. Klaproth deems this a corruption of Ατελ χαι Ουζον (Atel and Usu).

Atel or Itil simply means river in Turkish, and we find it used in several cases with a qualifying adjective, as Yaik Itil, Tana Itil, Cholman Itil (the Kama), Keskonna Itil, and Orman Itil, in the government of Cherson (D'Ohsson, *Abul Cassim*, 30). In the present case, used alone, it doubtless, as Klaproth and others have agreed, refers to the great Itil, the Danube. The use of the Turkish word Atel in Atelkuzu is a strong corroboration of the other arguments here adduced for making the Magyars Turks.

Klaproth thinks Usu means the Bug, which he says is still called Uzu Su by the Nogays and the Turks of Constantinople. The Dnieper is so called by Sherefuddin and Anna Comnena, but the fact is the Bug and Dnieper may be considered as branches of the same river, both falling into the same long inlet.

Constantine enables us to fix roughly the position of Atel Kusu, by telling us it was watered by the rivers Barukh, Kubu, Trullos, Brutos, and Seretos. The last two are clearly the Pruth and the Sereth, while the Trullos is the Dniester, still called Turla by the Turks (*op. cit.*, 281). Atel Kusu therefore answered to the modern lower Moldavia and Bessarabia

After some years "the Turks" were again driven out, and their land was occupied by the Pechenegs, who were called Bissi or Bisseni by the Hungarians, a name which seems to still survive in Bessarabia. The outcasts migrated westwards and occupied Great Moravia (*Stritter* iii., 610).

These outcasts consisted, I argue, of the old Unugari or Hungari, who were largely a Ugrian race led by a caste of Turkish Magyars.

That the term Hungarians does not connote in early times the same thing as the term Magyar I have shown in my previous letter. To the facts there quoted I may add that while the Magyars only appear in the west at the end of the ninth century, the Hungarians are known at a much earlier date. Thus, according to Klaproth, we are told, in a curious passage of the Acta Sanctorum, that as early as 750 the Hungarians (*impia gens Hungarorum*) passed the Danube, and advanced as far as the Grisons, where they destroyed the Monastery of Dessertina, founded by Saint Sigebert. In 838 we meet with Hungarians on the Lower Danube. They are then mentioned as allies of the Bulgarians against the Eastern Empire, and are called Ungri or Hungri, and also Hunni and Turki. In 862 the Ungri are found attacking the dominions of Louis the German. This is the first time they are mentioned as invading Germany (Klaproth, *Tableaux Historiques de l'Asie*, 278 and 279). The first appearance of the Magyars proper in history, so far as I know, is in the year 888, when they are named by several Byzantine authors, who, however, like the Emperor Constantine, call them Turks. The Emperor Leo was then at war with the Bulgarians, and we are told he sent messengers to the Turks (*i.e.*, the Magyars), who were then under their chiefs Arpad and Kusan (a variant has Korsan) (*Stritter* iii., 615). Shortly after they accordingly crossed the Danube and ravaged Bulgaria, and, having afterwards defeated Simeon, the Bulgarian King, and made many captives, they sent to the Emperor to ask him to buy them from them, which he agreed to do (*id.*, 616). Zonaras, who wrote, and who seems to have copied, this account, replaces Turks by Ungari, while the Emperor Constantine most incongruously assigns the campaign not to Arpad but to his son Liuntic (*id.*, 615 *note*). At this time, therefore, it would seem the Magyars or Turks were the dominant people north of the Danube and in the country of Atelkusu.

Some time after, Simeon, having made peace with the Romans, allied himself with the Pechenegs and entered into an offensive treaty with them against the Turks. The Turks were very badly beaten and had to evacuate their land, and migrated westwards (*id.* iii., 608), probably to Transylvania. The Frank historians date the arrival of the Hungarians (*i.e.*, the Magyars) in Europe in 889 (*Reginon ad. ann.*). In 892, Arnulf summoned them to his assistance against Sviatopolk, the great King of Moravia. In 893 they invaded Bavaria.

I have shown in my previous letter that the Avars were by no means extinguished by Charlemagne. Eginhardt, in recapitulating the wars of the latter in Pannonia, says merely that all their *nobility* perished and all their glory fled (Eginhardt, vit. *Car. Mag.*, 13). Thierry, *Histoire d'Attila et ses Successeurs* ii., 192). Nowhere do we read that the Avars themselves were destroyed. The war lasted till 803, and its issue is told in the laconic phrase of the Poeta Saxo. Speaking of their Khakan Tudun, he says:—

> "Mutans (Tudun) promissa fidem que,
> Perfidiæ tulerat parvo post tempore pœnas."

Tudun having disappeared, his successor, Zodan, submitted, with his people, to the great conqueror. It is true that Charlemagne nominated five counts, namely, Gontram, Weremhar or Berenger, Albric, Gotfred, and Gerold, to govern the march of Pannonia, and that he subjected "Hunnia" to the ecclesiastical jurisdiction of the Bishop of Salzburg (Thierry, *op. cit.*, ii., 188); but this is very far from saying that the Avars were exterminated. The Khakans still ruled in Pannonia. The one who is mentioned in 805 is named Theodore. He was probably the Zodan above named, under a Christian name. He was succeeded by another Khakan, who was named Abraham, and who was baptized at Fiskaha, in the diocese of Ratisbon (*id.*, ii., 189). This was followed by that of a large number of his people.

The power of the race was, however, much curtailed, and they became to some extent the victims of their Slavic neighbours, over whom they had tyrannized in the days of their prosperity. To escape from these attacks a large number of the Avars determined to migrate south of the Danube, and under their Khakan they asked Charlemagne's permission to be allowed to settle between Carnuntum and Sabaria, on the two flanks of the Cettian Alps. This request was granted them, the district east of the mountains took the name of Avaria, while that stretching from Comagene to the Ens was called Hunnia (*id.*, 193). This migration took place under the Khakan Theodore, who also received permission to retain the same status and dignity in his new quarters which the ancient Khakans had held among the Huns (*Annales Mettenses ad ann.* 805. Thierry, *op. cit.*, 194).

The Emperor Constantine Porphyrogenitus speaks of these Avars as still remaining in Croatia, when he wrote:—"Suntque etiamnum in Chrovatis Avarum reliquiæ et Avares esse cognoscunter" (*Schafarik* ii., 278). It was from them no doubt the Croats derived the Avar title of Ban, and Schafarik argues that the likeness which has been noted between the modern Morlacks and the Kirghises is to be explained by their descent from these Avars (*id.*). The migration, howver, was, as Thierry says, not a complete one, and numbers of the Avars remained behind in Pannonia, and fortified themselves in the marshes and other strong positions. In 811 we find three Avar princes, named Cani, Zauci, and Tudun, attending the diet at Aachen, from Pannonia, in reference to the settlement of the boundary between themselves and the Slavs. The Avars took part in 819, in the revolt of Liudewit, and sent envoys, as I have mentioned in my previous letter, to the Emperor Louis in 822. In 826 we find the Pope Eugenius II. addressing a letter to the people living in the Danube valley and to their chiefs, especially to the Khakan Tutundus and to Moimar, the Duke of Moravia (Thierry ii., 195).

This is ample evidence that the Avars remained an important stock in Pannonia long after Charlemagne's wars, and strengthens greatly my contention that they formed a large portion of the Hungarians.

The traditions of the Hungarians confirm this, as the following sentence of Thierry shows. Speaking of their arrival in Hungary at the end of the ninth century, he says:—"Here and there they found scattered over the land sections of the Avars, who could not be indifferent to the arrival of a people related to them by origin and language. The part which these subjects of Tudun could take in assisting the Hungarians in their contest with the Slavs is not clearly shown in history; but tradition affirms that both in Transylvania and elsewhere their co-operation was that of brothers with brothers" (*Attila et ses Successeurs*, ii., 213).

Again, it is curious to find the terms Avar and Hungarian used indiscriminately by some of the early Frank analyists, as in the Fuldensian Annals. Thus, under the year 894, we read:—"Avari qui dicuntur Ungari in his temporibus ultra Danubium peragrantes," &c. (*Pertz*, ii., 410). In 896:—"Pacem ergo Græci cum eodem anno cum Avaris (qui dicuntur Ungari) facientes," &c. Later in the same paragraph they are called Avars simply. Again, in 900:—"Interim vero Avari (qui dicuntur Ungari) tota devastata Italia," &c.

On the other hand, we have other proofs that Turkish tribes formed a part of the later Magyar nation. Thus a section of the Pechenegs, who were called Besseni, were settled on the Theiss and in the county of Wieselburg:—"Dux Zulta fixit metas regni Hungariæ, ... et ex parte Theotonicorum usque ad pontem Guncil. . . . . . et in eodem confinio *ultra lutum Musun* (Wieselburg, in Hungarian, Mosony) *collocavit etiam Bissenos* non paucos habitare, pro defensione regni sui, ut ne aliquando in posterum furibundi Theotonici propter injuriam sibi illatam fines Hungarorum devastare possent. . . . . De terra *Byssenorum* venit quidam miles de ducali progenie, cujus nomen fuit Thomizoba pater Urkund, a quo descendit genus Thomoy, cui dux Thocsun dedit terram habitandi *in partibus Remey usque Tysciam ubi* nunc est portus" (*Obad. Notar.*, c. 57; *Zeuss*, 754). Others were planted on the northern frontier, and "villæ Bissenorum" occur in old documents (*Zeuss*, *id.*).

I have already quoted several authorities showing that Magyar and Bashkir were synonyms with the Arab writers. I must quote one from Yakut, who wrote in the 13th century at greater length. I take it from Fræhn's translation, and the narrative was taken down from a Bashkir who happened to be at Aleppo:—"Ego vero offendi in urbe Haleb magno numero genus hominum, qui Baschgurdi audiebant, crinibus et facie valde rubicundis erant et scientiæ juris sacri juxta ritum Abu-Hanifæ operam dabant. Eorum aliquis, quem adieram, de ipsorum patria rebusque percontanti mihi respondit: Terra nostra ultra Constantinopolin jacet in regno alicujus nationis Francicæ (*i.e.* Europæ), cui nomen Hungerorum est. Nos Muhammedis sacra profitentes, eorum regi subditi in tractu regni ejus *quodam trigintu admodum incolimus pagos*, quorum quisque etiamsi parum absit, quin oppidulum referat, rex tamen Hungerorum metu, ne ipsius detrectemus imperium, ullum eorum muris saepiri vetat" (*Zeuss*, 755). This shows that the Bashkirs or Magyars were planted in Hungary much as the Comani were at a later date. I must remark that Ibn Fozlan specifically calls his Bashkirs Turks, and Rubruquis tells us they were shepherds, which also shows they were Turks (*Zeuss*, 748). Masudi, in conclusion, in describing the Western Bashkirs, says they were Turks like the Pechenegs (*D'Ohsson, Abul Cassim*).

I remain, yours respectfully,

HENRY H. HOWORTH.

DERBY HOUSE, ECCLES.

THE DRAINAGE OF THE YARKAND RIVER.

To the Editor of the "GEOGRAPHICAL MAGAZINE."

SIR,—Reading Major Herbert Wood's paper on the drainage of the Oxus basin in your September number, it occurred to me to compare the figures whch he gives with the approximate ones obtained by me for the Yarkand River, which is fed from the same mountain system that gives rise to the Oxus, but from the drier and more barren side of it.

The maximum flood discharge of the Yarkand River, as roughly determined by me in the end of July 1875, amounted to 68,190[*] cubic feet per second. This was the quantity that passed the Yangi-bazàr Ferry, near Yarkand, a point *below* the mouths of all the irrigation channels which fertilise, or, rather, create, the Province of Yarkand. This is, of course, far above the junction of the other rivers of Eastern Turkistàn, which, with the Yàrkand River, make up the great Tarîm Gol (so-called). The area of the drainage basin of the Yarkand River proper, down to this point, I make out to be about 17,000 square miles. We therefore get the following comparative table of the proportion of maximum discharge to drainage area, in the several Alpine rivers enumerated by Major Wood, together with two Central Asian rivers:—

Oxus	1·75 cub. ft. per sec.	per sq. m.	of drainage area.
Yarkand River	4·00 (about)	do.	do.
Arve	10 or 11	do.	do.
Upper Rhone.	11·25	do.	do.
Upper Ticino.	11·75	do.	do.

It must be remembered that the figure for the Yarkand River *excludes*, while that for the Oxus *includes*, the whole of the water taken out by the great system of canals which fertilise the Yarkand and the Khiva Provinces respectively. Were the canal water included in the calculation for the Yarkand River, its figure would differ still more from that which represents the discharge of the Oxus. As it is, if we take the average of the maximum discharge of the Alpine rivers (per square mile of area) as 100, the discharge of the Yarkand River would be about 36, and that of the Oxus about 16.

As the rain and other products of precipitation in the Yarkand River basin are certainly less, and not greater, than those of the Oxus basin, the figures above given for the former river seem to corroborate Major Wood's opinion, that we must seek some special cause for the smallness of the Oxus floods. The Yarkand River, with less rainfall, and after supplying water to all its canals, yet brings down floods more than twice as large in proportion as those of the Oxus at a point where the latter is still in possession of all its canal water.

However, it must be remembered that in the long course of 450 miles between the point where the Oxus receives its lowest affluent and the point where its flood was measured, a great deal of water may be lost by what engineers call "spilling," and by evaporation. It is much to be desired, as Major Wood says, that the flood volume of the Oxus should be measured at the point where it ceases to receive any more water from tributaries.

Yours, &c.,

ROBERT B. SHAW.

SIMLA, *October 24th*, 1877.

THE MARQUIS ANTINORI.

To the Editor of the "GEOGRAPHICAL MAGAZINE."

MONSIEUR,—Le télégramme du *Times*, daté de Rome, suivant lequel notre Société de Géographie aurait reçu la nouvelle de la mort du Marquis Antinori, est contraire à la vérité. La société n'a jamais reçu de pareilles nouvelles. Les lettres envoyés du Cairo par M. Matteucci reportent, il est vrai, le *bruit* de la mort d'*un blanc* dans la bataille où le roi Menelik a été battu; mais les déclarations de M. Matteucci lui-meme et de notre Consul-général demontrent à l'évidence, que dans l'indication d'un nom particulier il n'y a qu'une combinaison arbitraire.

Il faut dire le meme des nouvelles concernant M. Chiarini.

Je vous prie, Monsieur le Directeur, de vouloir bien rectifier dans ce sens le télégramme sousdit, et d'agréer les assurances de ma consideration distinguée.

LE SECRÉTAIRE GÉNÉRAL,

J. DALLA VEDOVA.

ROME, *li 22nd November*, 1877.

---

[*] This was kindly calculated out from my data by Colonel Gulliver, R.E., Chief of the Panjàb Canal Department.

Proceedings of Geographical Societies.

ROYAL GEOGRAPHICAL SOCIETY.

Meeting of 12th November, 1877.

President's Address.

THE forty-eighth session was opened under the presidency of SIR RUTHERFORD ALCOCK. In his inaugural address reference was first made to the lectures on Physical Geography, which were delivered during the last session, and which, owing to their success, would be continued for another year. The first, "On the Formation of the Great Land Masses of the Earth," would be delivered by Professor Duncan; the second, "On Terrestrial Magnetism," by Captain F. J. Evans; and the third, "On Plant Distribution as a Field of Geographical Research," by Mr. Thiselton Dyer. The proceedings of the Geographical Section of the British Association at Plymouth, and the principal geographical events that had occurred during the recess, were next touched upon. Attention was then called to the Brussels Conference and the objects of the International Commission for the Exploration and Civilisation of Africa, founded by the King of the Belgians. Concerning this great undertaking, Sir Rutherford remarked that, although it was the natural desire of the British members, geographers, and others invited to the Conference to co-operate cordially in furtherance of its objects, the Royal Geographical Society could not, by its constitution, enter upon any field of operations other than that of exploration. Commercial enterprise, suppression of the slave trade, and missionary or other civilising efforts were not within their province, and must be undertaken by independent agencies. He felt sure that the Society would be gratified to learn that the first Expedition, under the direction of the International Commission of Brussels left Southampton for Zanzibar on the 18th of last month, having for its object the formation of a station at or beyond Lake Tanganyika, with depôts at Zanzibar and Unyamwesi. The African Exploration Committee of the Society's Council had granted the sum of 250*l.* to the Executive Commission at Brussels, and had recommended the Expedition to the Consul-General at Zanzibar, and through him to the Sultan, and also to the London and the Church Missionary Societies, with a view to obtaining a welcome for the Expedition. Sir Rutherford was happy to say that the Brussels Commission already possessed a capital of some 300,000 francs, contributed chiefly in Belgium, and an income of 75,000 francs.

With reference to the action of other countries, the President informed the meeting that France had established a National Committee to co-operate with Brussels, under the presidency of M. de Lesseps, and reminded them of the persevering attempts France had made to penetrate the interior of Africa from the Gaboon, by ascending the Ogowé. The German National Committee had been merged into a "German African Society," distinct from the "German African Society for the Exploration of Equatorial Africa," and was about to despatch its first Expedition, under Herr Schütte, an engineer and scientific topographer, with a view to penetrate the interior from Angola on the west coast. Nothing further had been heard of the Austrian National Committee, since the announcement that it had contributed 5000 francs to the Brussels Commission. In Hungary a separate National Committee had been formed, which had also forwarded 3000 francs to the International Commission. Under the presidency of the Crown Prince Humbert, Italy had held important meetings, and, for the present, it was resolved to devote all support to the Expedition of the Marquis Antinori, who was engaged in endeavouring to penetrate the unknown region lying between Shoa and Lake Victoria Nyanza. Owing to unforeseen expenses and losses, it had been found necessary to despatch one of its members, Captain Martini, to Italy for further supplies, and, in company with Signor Cecchi, he had returned to Zeila re-equipped. The latest accounts stated that these two gentlemen had rejoined their chief, and there were now hopes of the Expedition being able to push on towards the Victoria Nyanza. The Portuguese Government, owing no doubt to the narratives and revelations of Cameron and Young, resolved last year to do something towards the scientific exploration of the unknown regions adjoining their African possessions. A Geographical Committee in connection with the Department of Marine, but distinct from the Lisbon Geographical Society, had been established, and an Expedition was decided upon, the Government granting a sum of 20,000*l.* towards its expenses. This Expedition, consisting of Senhor Serpa Pinto, Senhor H. Capello, and Lieutenant R. Ivens, left Europe last June for Loando. The route decided upon was the ascent of the Cassabi, and the examination of the relations of its basin with those of the Quanza, the Cunene, and the Zambesi, terminating with a journey to the east coast.

The work of the various Missionary Societies of Great Britain in the exploration and civilisation of Africa was next reviewed. The French Société de St. Esprit had a mission established at Bagamoyo, on the east coast. In 1871, when Stanley arrived on his first expedition in search of Livingstone, he found there ten Padres and a like number of Sisters of Mercy. He was most hospitably received, and reported that not only had they founded a mission, constituting a village of sixteen houses, some solidly built, but schools, at which 200 boys and girls were under tuition, while the influence of the mission was considerable, and eminently beneficial to the surrounding native population.

In addition to all these workers in the missionary field who were aiding geographical exploration, there were many travellers who might not lay claim to the title of geographers, but from whom useful information was often derived in the field of African exploration. The German Geographical Society of Berlin held a meeting a few months ago, to hear the account of the travels of two successful African explorers of this character who had just returned home—Dr. Lenz, a Geologist, and Dr. Pogge. The latter had made a most remarkable journey, and one which placed him high in the list of African travellers. He had succeeded in penetrating from St. Paul de Loanda to the capital of the renowned African potentate, Muata Yanvo, a remote district which had hitherto never been reached by any explorer, and even by very few coloured Angola traders. The capital, Musumbé, lies to the north of Kabebe, the seat of government of that monarch, and many days' journey to the west and north of Cameron's line of march. Dr. Pogge travelled for pleasure as a hunter of the larger African game, and not as a scientific explorer; but some of the information he obtained was of high interest, particularly as to the healthiness and beauty of the interior plateau.

Geographers and Missionaries alike, Sir Rutherford went on to say, had thus far done their respective parts with untiring energy, and were ready to still further complete the work undertaken, by searching out and connecting the few missing links to the main lines. It was for trade, aided if need be by the State, jointly interested as both are in the realisation of such prospects as the latest discoveries opened, to take up the work. To our merchants and Government we must now look for the enterprise and means to accomplish the three great ends of so much previous effort—the development of a trade of vast national importance, the civilisation of Africa, and the suppression of the slave trade, for which last object, since the abolition of slavery in the British dominions, a sum of more than 70,000,000*l.* had been expended by this country. The brilliant triumph of Stanley, it might fairly be hoped, would renew the lively interest once felt in the object of all Livingstone's labours. It was the deliberate opinion of both Cameron and Stanley that the opening up of Central Africa presented no insurmountable difficulties. The three high roads for waggons from the east coast, one to Victoria Nyanza, another to Nyassa, and a third to Tanganyika, would do all that was necessary to open up Central Africa, and substitute a legitimate commerce for the slave trade. The bullock-waggon and the steamboat would do the rest, until the time came for the rail and telegraph to complete the work. It might seem visionary to talk of such things for Central Africa, but the obstacles of these were not greater than had been overcome in other countries.

In conclusion, Sir Rutherford expressed a hope in which he felt confident all present would heartily join, that Great Britain, so long in the foremost rank, would not be the last on the muster-roll of those countries which are destined to bring the African race, and the inexhaustible wealth of their fertile soil, their mineral products, and free labour, within the circle of modern civilisation, and under the safeguard of public law and humanising influences.

Mr. CLEMENTS MARKHAM then read a paper by M. PHILIPPE BROYON-MIRAMBO, being a

DESCRIPTION OF UNIAMUESI, THE TERRITORY OF KING MIRAMBO, AND THE BEST ROUTE THITHER FROM THE EAST COAST.

The paper was prefaced with a brief biographical sketch of its author, who is a native of Switzerland, and about thirty-two years of age. At the age of eighteen he made his first voyage to Zanzibar as a seaman, and after a second voyage, having determined to remain at Zanzibar, served for some years in the offices of a trading house. During his voyages he learnt enough of navigation to enable him to take command of a small vessel which was engaged in the coasting trade about Zanzibar. Wishing for further travel and adventure, he gave up this employment, and went over to Saadini, on the mainland, where he joined a caravan journeying to the interior, and with it reached Urambo, in Uniamuesi. There he formed close friendship with Mirambo, the king of the country, and after going through the ceremony of blood brothership with him, married his eldest daughter.

Uniamuesi lies between 32° and 34° E. long., and from 2° 30′ to 6° S. lat. The great family of the Uniamuesi is divided into six large tribes, which, although very distinct from one another in general appearance, are very similar in respect of language and customs. The Wagazaganza, the most intelligent of these tribes, inhabit the central part of the east portion of the country, and trade chiefly in ivory. The other tribes are the Wassambua, inhabiting the western districts; the Watakama, the south-west; the Wakanongo, the south; the Wazinja, the north-west; and the Wasekuma, the north.

Previous to the reign of Mirambo the country was in a very disturbed state, owing to the raids of the Watussi, a people from the north, who scattered themselves all over the country, and, owing to the dissensions existing between the various chiefs of Uniamuesi, were able to tyrannise over all the tribes. But this state of things soon changed when Mirambo united all Central Uniamuesi under his rule, and the Watussi, instead of being masters, were soon reduced to the condition of servants. The different chiefs were allowed to remain rulers in all that concerns the interior government of the country; but in time of war are obliged to march at the head of their troops, under the orders of the supreme chief, any infraction of which was punishable with death.

The Uniamuesi believe in a God, but are very superstitious, and worship their ancestors. The most superstitious are the Wasekuma, who are always loaded with talismans and amulets; and from this tribe generally come the diviners and medicine men.

The Uniamuesi are polygamists, and are allowed to have as many wives as their means will permit. When a young man possesses a few iron hoe-blades, some beads, or one or two "doti" of cotton-stuff, he is in a position to marry. He begins then, with the aid of some of his friends, to build a hut; that finished, he offers his goods, through the mediation of a friend, to the parents of the girl he desires to have for his wife. After some debate, the bargain is concluded, and the *fiancée* at once enters into the business by preparing the pombé, or millet beer—the favourite beverage of all the people east of the great lake—against the wedding-day. On the day of the marriage, the father of the bride gives, according to his social position, it may be an ox, a sheep, or some fowls for the feast, to which all the village is cordially invited; and the tam-tam is in great force. After this ceremony, the husband has almost the right of ownership of his wife. If she deserts him, or if her conduct makes it desirable, she may be sent back to her parents, who are held responsible either to return the goods that were given for her, or to provide another wife.

The long period during which Uniamuesi had been subject to the yoke of the Arabs of Unianyembé had left its traces. One custom, instituted in former times by the Arabs for their profit, still remained, in spite of the check which Mirambo has placed upon their despotism. Thus, when a woman is maltreated by her husband, if she breaks any dish or weapon belonging to the chief of the village, she becomes by this act his slave, and is not given back to her husband unless she herself consents to this, and unless he pays a ransom for her to the chief. The Arabs, when they were in power, established this custom, and extended it to such a degree that any native, of whatever rank or sex, who broke or carelessly injured any article belonging to an Arab, was declared a slave, with all his family. All were fettered and sent off, either to Unianyembé, to be employed in the fields there, or westward to Tanganyika, to be exchanged for ivory among the cannibals, who fattened them up for eating.

As the villages are not generally inhabited by others than the descendants of the founder, sometimes the whole population of one of these was to be seen in chains, and the Arab who a day or two before only possessed some bundles of cotton goods, advanced to him it may be by a Banyan of Zanzibar, was a rich man by a single stroke, and could set up house at Unianyembé, in the sumptuous style of life so well described by Speke, Stanley, and Cameron.

As a rule, the Uniamuesi do not bury their dead, this rite being reserved for kings and chiefs. On the death of a chief the body is laced up with cords in a squatting posture, the head between the knees, and the hands closed over the eyes. The body is then lowered into a circular pit about 2 yards deep, and reposes on a circular seat or board.

The productions of the country are iron, found in great abundance in the south and west; and on the frontiers of Uvinza are salt-beds, the salt of which is of a very fine grain. Rice is much cultivated, as are also mtama, smaller millet, sweet potatoes, yams, groundnuts, and bananas. At seed and harvest time the Uniamuesi generally remain at home. They are good agriculturists, and consequently provisions are abundant. There is very little cultivation, but extensive pasture lands; and butter, milk, and wild honey may be obtained very cheaply.

Being invited to address the meeting, Mr. E. HUTCHINSON, of the Church Missionary Society, said he fully agreed with the President's remarks respecting the future of Africa. He wished to call attention to the fact, that in Africa two missionary societies were labouring side by side. No doubt Sir Rutherford's experience in China had taught him what difficulties arose from the introduction of various forms of Christianity into heathen countries; but the Church Missionary Society and the London Missionary Society afforded an illustration of how those who really had the welfare of a country at heart might work harmoniously together. Sir Rutherford was perfectly right in saying that, in dealing with the future of Africa, enterprise should proceed from the east coast. Those who were really interested in the matter had resolved to begin from the east coast. It was felt that if anything great was to be accomplished, there must be some radical change in the system of porterage. He considered that all interested in East Africa were greatly indebted to the researches, energy, and information furnished by Dr. Kirk, for it was he who had pointed out that the great obstacle to penetrating Africa—the tsetse fly—ceased to exist to the north of the river system, of which the Wami was the centre, and a higher level of country took the place of marsh and morass. The Church Missionary Society and the London Missionary Society were doing all in their power towards the establishment of civilisation and commerce. They had already received great assistance from Mirambo, who was going to establish on his own account a service of bullock waggons over the road which the Church Missionary Society had made. From information received from Colonel Gordon it appeared that King Mtesa was anxious for Christian teachers, and they had reason to hope that such facilities would be afforded by the Egyptian Government as to enable them to send missionaries and supplies up the Nile. With regard to the Belgian Expedition, he hoped they would make no attempt to establish themselves at Unianyembé, which was a fatal place for Europeans. The Church Missionary party were laid up there for a month by a most disastrous attack of fever. The Belgians would find Meninga a much more suitable spot, as it was a healthy place, with abundance of water. For the Niger Mission a steamer had been specially built for missionary and pioneer work, under Bishop Crowther, and the Church Missionary Society would do all in their power to work harmoniously with the Royal Geographical Society, should that society wish to make any exploration on that river.

The President, in conclusion, trusted that what had been said would increase the interest in the opening up of Africa. It was now merely a question of money whether it should be done speedily or at all; and it was with great delight that he had heard that the Church Missionary Society was about to provide the necessary facilities for the Christianising of the whole 5,000,000 subjects of King Mtesa.

———:o:———

IMPERIAL RUSSIAN GEOGRAPHICAL SOCIETY.

Monthly Meeting of 5th (17th) October, 1877.

M. de Semenof, Vice-President, in the chair. M. Sreznefsky, the Secretary, furnished an account of Colonel Prejevalsky's Expedition to Central Asia and the Lob-Nor country. The Colonel returned to Kuldja at the beginning of July last, and until the close of August had been engaged in arranging his collections. The scientific results comprise a route survey from Kuldja for a distance of 1200 versts into the heart of Asia, the determination of the latitude and longitude of seven points, a number of barometric determinations of height, meteorological observations taken four times a day, a botanical collection comprising 300 different species of plants, 94 skins of mammalia, 180 species of birds, 50 of fishes, 150 reptiles, and more than 2000 insects. There are also four wild camels, which constitute an attractive feature of the collection. The collections have been carefully packed, and are expected at the Museum of the Academy of Sciences in the course of the winter.

After resting for a brief time at Kuldja, Colonel Prejevalsky set out towards the end of August for Tibet. Having ascertained that it is impossible to reach Tibet by way of Lob-Nor and the arid desert beyond the Altyn-Tag Mountains, the Colonel decided to follow another route, by way of Guchen and Hami, and thence to make for Tsaidam and the sources of the Yang-tse or Murui-ussu. He thus reckons upon arriving at Lhasa about May or June, 1878, exploring Tibet, and returning to Russia in the autumn of 1879.

The Secretary communicated intelligence respecting M. Potanin's Expedition, letters from him having been received about the middle of September. The Expedition left Kobdo towards the close of March, in two parties: one, with the heavy baggage, making direct for Lan-chow; and the other, consisting of Messrs. Potanin and Rafailof, making for Hami by way of the Ulan Daban Pass, over the Ektag Altai Range and Barkul (the route between those two points being apparently a new one, lying between those marked on Mr. Ravenstein's map of Western Mongolia. See *Geographical Magazine* for July 1875). Hami was reached on the 16th (28th) May, and here, thanks to the good offices of M. Shishmaref, Russian consul at Urga, they were well received and housed by the Chinese authorities. On leaving Hami they journeyed northward, and crossed the Tian-Shan by the same pass as Colonel Sosnofsky had travelled by, and, turning to the east, skirted the northern side of the eastern prolongation of the Tian-Shan, a range covered with perpetual snow. On reaching the village of Nom-Tologoi the party turned northward, and, having traversed for the second time the desert of Gobi, reached the southern limit of the Adjia-Vogdo, a spur of the Altai Range. The latter was crossed by the Kernuru-Davan Pass, situated between the Saksa and Tsitsirin-Gol Valleys, and after crossing a parallel chain called Taimir-Ola, they arrived at Uliassutai on the 13th (25th) July.

A very plentiful botanical collection was made from the flora of the Tian-Shan and Altai, but that of the plains was excessively poor. The party contemplated an excursion to the sources of the Yenisei, and by the end of July they proposed starting for Lake Kossogol, and from thence making their way to Lake Ubsa, and by the way of the Chui River to Biisk.

Several members of the Society had made scientific researches during the summer. M. Raiefsky has been making inquiries on the production of and trade in wheat in northern Russia; Baron Osten Sacken is pursuing ethnological studies in Austria; M. Sidorof has traversed the Siberian Polar Sea and Sea of Kara from the mouth of the Yenisei to the coast of Norway; and M. Mainof has amassed much important ethnographical and geographical information from the country of the Finns of the Volga. The expedition, which will examine the water-parting between the Ob and the Yenisei, has been occupied in a preliminary investigation of all existing information on the subject, and will not begin its field work till next spring.

The Secretary read an extract from a paper he had compiled on Colonel Prejevalsky's discoveries, and the Vice-President dwelt on the scientific value of these researches, and of those of Sosnofsky, Kourapatkin, and others. Reference was also made by M. de Semenof to Colonel de Thillo's work on the levels of the Aralo-Caspian region. M. Mainof read a paper on his travels above referred to.

———:o:———

BERLIN GEOGRAPHICAL SOCIETY.

May 5th, 1877.—Herr Bastian presiding. Herr von Richthofen read a paper on the ancient route across Asia of the silk merchants, from Ptolemy and Chinese sources, which we propose to lay before our readers in our next number. A discussion then ensued between the author and Herr Kiepert, in which the latter expressed some divergence from the opinions put forward by the former.

June 22nd, 1877.—Herr BASTIAN presiding. Herr KIEPERT presented his new map of Armenia, which embraces all available information, and shows many additions to our previous knowledge of that region. Herr REISS read a paper on his travels in the northern part of South America, undertaken with Dr. Stubel, of Dresden. Both these travellers were geologists, and the object of their expedition was to discover volcanic mountains. They ascended the Magdalena River, in the Colombian States, and after remaining six months in the tract between Pasto and the boundary of Equador, crossed the frontier to Quito, which was the centre of their researches for five years. In 1875, they journeyed to the source of the Marañon, and eventually travelled down the river, and after visiting Pernambuco, Bahia, Rio, and other noted places, Herr Reiss returned to Europe in April 1876, while Dr. Stubel remained to undertake further journeys in Bolivia, Peru, and Chile. He was expected in Germany this autumn.

Herr POLAKOFSKY read a paper on the eastern part of the Republic of Costa-Rica, in the course of which he referred to the importance which this region had derived from schemes for constructing a ship canal across central America, and to our scanty geographical knowledge thereof. This is in a great measure due to the paucity of population, which amounts to 180,000 souls only, for a country as large as Bavaria, and which renders travelling costly and difficult. With the exception of the coast lines, the inhabited tract in the centre, and the route across from the Atlantic to the Pacific, the delineation of the country rests on the statements of hunters, gold-seekers, and caoutchouc-collectors. The newest map of Costa-Rica is Friederichsen's, published in Hamburg, in 1876, but this the author described as practically only an enlarged edition of that of Von Frantzius and Petermann, in 1869, and he furthermore cited several minor inaccuracies in the map, including one in the delineation of the northern frontier of the Republic. (Herr Friederichsen has since entered into a defence of his map. (See our November number, p. 306.)

July 7th, 1877.—Herr BASTIAN presiding. Herr NACHTIGAL read a paper on the present position of the International Association for the Exploration of Central Africa, giving a complete summary of the proceedings of the body, from its constitution up to the departure of the Belgian Expedition, in October last.

Herr ASCHERSON read some notes on the botanical results of Dr. Pogge's last journey into Central Africa, and Professor Jessen exhibited two maps designed by him, the first showing the extent of growth of wheat and the statistics of its yield and export, and the other the different regions or zones of fruit trees throughout the globe.

———:o:———

FRENCH GEOGRAPHICAL SOCIETY.

October 17th, 1877.—M. LEVASSEUR presiding. After mentioning the prizes awarded by the Society to pupils in *lycées* in the recent competition, the PRESIDENT announced the purchase of a plot of ground for the erection thereon of a building suitable for the requirements of the Society. M. Marche, from the Ogowai, and M. Wiener, from Bolivia, were both welcomed on their return. The French consul at Zanzibar wrote to the effect that Captain Wharton, R.N., had surveyed, in a careful and detailed manner, the coast of Zanzibar from Monfia to Kilwa, and added some particulars respecting the stations founded on the island of Pemba, to serve as central places of resort for the negroes. Captain Wharton stated that proposals were afoot for laying a telegraphic cable from Aden, by way of Mozambique and Zanzibar, to the Cape of Good Hope, and for another from Mozambique to the Mauritius, by way of the Comoro Islands and the north of Madagascar.

The SECRETARY then read an account of M. Marche's travels along the Ogowai River. M. Marche was deputed by the Minister of Public Instruction to accompany M. de Brazza as Naturalist. He arrived at the Gaboon in October 1875, and having provisioned his party at Sam-Quita, he finally reached Lope in February 1876. He then explored the River Ofue, which appeared to come from the south-west, and, ascending the Ogowai, reached Ivindo, the furthest point attained by Compiègne and himself in 1874. After meeting M. de Brazza on the 18th August, the two ascended the river in company for a brief space, and then M. Marche pushed on by himself, and having passed the furthest point reached by Dr. Lenz, he finally halted on the 28th September, at a place called Byango. A little distance beyond that point there runs a river called Bombi, which (as it would appear from the native account) unites the Congo or Zaire with the Upper Ogowai, and forms a medium of intercommunication for trade. This fact (M. Marche added) is borne out by old Portuguese maps.

The SECRETARY then read an account of M. de Ujfalvy's travels in Ferghanah, and M. Duveyrier followed with an account of Mr. Stanley's exploration of the Lualaba or Congo. M. WYSE presented a large-scale map of the Isthmus of Darien, and the Baron DE CHAMPLOUIS one of Belgium and the north and north-east of France, shown continuously, so as to illustrate the route of the Nord railways.

———:o:———

PARIS SOCIETY OF COMMERCIAL GEOGRAPHY.

October 26th, 1877.—M. MEURAND presiding. M. CH. HERTZ read a brief summary of the doings of the society up to date, including the part it played at the Association for the Advancement of Science at Havre, where it was represented by M. Coquelin and M. Capitaine. M. MOUNIE read a paper on the basin of the Rio Colorado, and its suitableness for colonisation. M. BRAV DE SAINT-POL LIAS gave an account of the proceedings of his colonising party in Sumatra.

NOTICE.

The Office of THE GEOGRAPHICAL MAGAZINE *is at* 57 *&* 59, *Ludgate Hill, E.C.*

Manuscripts sent to the Editor cannot be returned, nor can the Editor be responsible for them.

Letters and Articles intended for insertion should be written on one side of the paper only, and must be accompanied by the name and address of the writer; not for publication, but as a mark of good faith.

The right of translation is reserved.

Annual Subscription and Postage, £1, *Inland. Foreign Orders must be accompanied by P.O.O. or Cheques to include the full amount of Foreign Postage. Post Office Orders to be made payable to Messrs. Trübner & Co.,* 57 *&* 59, *Ludgate Hill, London, E.C.*

81[illegible]

UNIVERSITY OF CALIFORNIA
LOS ANGELES
LIBRARY

UNIVERSITY OF CALIFORNIA-LOS ANGELES

L 010 611 346 7